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**de la Loi sur l'accès à l'information**

## Nutton, Byron

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**From:** Naito, Brian  
**Sent:** 2019–March-11 9:44 AM  
**To:** Nutton, Byron  
**Subject:** FW: Habitat Banking in Richmond, BC

Hey Byron,  
I assume that you are the lead on Habitat Banking but can you confirm and can I give the City of Richmond your contact information?  
Thanks.  
Brian

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**From:** Koster, Kristine <KKoster@richmond.ca>  
**Sent:** 2019–March-11 9:08 AM  
**To:** Naito, Brian <Brian.Naito@dfo-mpo.gc.ca>  
**Subject:** Habitat Banking in Richmond, BC

Greetings Brian,

I hope you are doing well. Perhaps you remember me? I wrote my thesis on habitat banking and met you for a tour of the and North Fraser Harbour Habitat Compensation Bank and Timberland Basin Habitat Bank. Thank you again for being so generous with your time and helping me with my research!

I am currently an Environmental Coordinator with the City of Richmond. The City is in the process of planning for major dike upgrades which will impact aquatic and riparian habitat. We are investigating compensation options and I've been tasked with gathering more information on whether there are habitat banking opportunities within the City.

Would you be interested in participating in a short conference call with my colleagues to discuss habitat banking?

Please don't hesitate to let me know if you have any questions.

Thanks kindly,  
Kristine



**Kristine Koster** M.Env. | Environmental Coordinator  
Engineering & Public Works | City of Richmond  
[kkoster@richmond.ca](mailto:kkoster@richmond.ca) | P: 604-247-4661

For any immediate operational concerns including spills to the environment, please contact the City's 24 hr Dispatch Center at 604.270.8721



## Nutton, Byron

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**From:** Olson, Charlotte <Charlotte.Olson@portvancouver.com>  
**Sent:** 2019-March-11 9:46 AM  
**To:** Nutton, Byron; Thorpe, Suzanne  
**Cc:** Ruffo, Gord; Scott Northrup  
**Subject:** Project Confirmation - Maplewood - FOR DFO REVIEW  
**Attachments:** 2019-03-04-03-200-VFPA-MMRP Project Confirmation-Rev0 (Final).pdf  
  
**Importance:** High

Good morning Byron and Suzanne,  
As discussed last Thursday, please find attached:

- Project Confirmation for the Maplewood Marine Restoration Project

We are looking forward to your review, and our discussion this Thursday at 11:30am.

Due to file size, note that in a separate email I will be providing the QEP Assisted Assessment, as supplementary documentation for your review if helpful.



Regards,  
Charlotte

**Charlotte Olson** P.Geo., PMP  
Manager, Infrastructure Habitat Development



**Vancouver Fraser Port Authority**  
100 The Pointe, 999 Canada Place  
Vancouver, B.C. Canada V6C 3T4

P: 604.665.9590 | CELL: 604.349.4111  
[portvancouver.com](http://portvancouver.com)

 <b>Habitat Enhancement Program</b>	 <b>Fisheries and Oceans Canada</b> <b>Pêches et Océans Canada</b>  <b><u>Project Confirmation</u></b>
<b>PROJECT NAME: MAPLEWOOD MARINE RESTORATION PROJECT</b>	

### Terminology used:

- “**Agreement**” refers to the Working Agreement Concerning Procedures for Development and Operation of the Port Metro Vancouver Habitat Bank between Vancouver Fraser Port Authority and Fisheries and Oceans Canada dated July 31, 2012 (signed September 10, 2012)
- “**DFO**” refers to Fisheries and Oceans Canada
- “**FPIP**” refers to Fisheries Productivity Investment Policy
- “**VFPA**” refers to Vancouver Fraser Port Authority
- “**Project**” refers to the proposed Maplewood Marine Restoration Project
- “**QEP**” refers to a Qualified Environmental Professional

### Preamble:

In accordance with the Agreement, this Project Confirmation will be used to confirm that:

- VFPA consulted and negotiated with DFO on the suitability of the above-referenced Project for habitat banking purposes.
- DFO agrees, in principle, that the above-referenced Project would be acceptable as fish habitat as identified herein.
- DFO agrees that the identified type of fish habitat and the approximate quantity of fish habitat would be suitable for habitat banking.
- The Project meets the terms of the Agreement with regard to need, fish habitat, productivity, site location, feasibility/cost, and ownership/tenure.
- DFO acknowledges that VFPA has developed the Project concept and will move to final design as identified in the attached drawings.

*This Project Confirmation is used to support the conditions and requirements of the Agreement and does not alter or modify the Agreement in any manner. This Project Confirmation will also be used to confirm that the Project, if constructed as proposed, meets the objectives of the FPIP. An assisted assessment was prepared for the Project. The assessment was conducted by a QEP in accordance with guidance from DFO's Projects Near Water web site and DFO's "Science Advice for Managing Risk and Uncertainty in Operational Decisions of the Fisheries Protection Program" (September, 2014). As would be expected for a viable habitat enhancement opportunity, the assessment concluded that the Project will result in an increase in the ongoing productivity of commercial, recreational and Aboriginal (CRA) fisheries in the Project area.*

*As the Project proceeds, VFPA will maintain responsibility to ensure that the Project has undergone appropriate reviews and assessments, including those mandated by applicable environmental assessment legislation (e.g., Species at Risk Act, if applicable) and any other VFPA-mandated reviews and assessments.*

## Project Overview:

The Maplewood Marine Restoration Project (MMRP or the Project) is located on the north shore of Burrard Inlet, approximately 2 km east of the Iron Workers Memorial Bridge and Second Narrows. The Project area includes the existing Maplewood Basin, a previously dredged area encompassing the Main Basin (~11.6 ha) and Northeast Basin (~4.5 ha), and the proposed Southwest Channel (~2.4 ha) located to the south of the Maplewood Flats Conservation Area (**Attachment 1**).

The Project area was identified as a restoration priority by Tsleil-Waututh Nation (TWN), with a specific request to establish a process between TWN and VFPA that enabled a collaborative design development process for MMRP. Through this process, VFPA has sought to ensure alignment between existing and future habitat enhancement priorities identified by Aboriginal groups, such as TWN.

The Project area was dredged in the 1940's to 1960's to accommodate both a gravel extraction operation and log sorting and storage. Dredging resulted in the conversion of approximately 17 ha of intertidal habitat to subtidal habitat. Partial infilling of dredged areas between 1969 and 1979 on the north side of the Project area created terrestrial habitat which is now the Maplewood Flats Conservation Area. This infilling also isolated an area of subtidal habitat from the Main Basin which is now referred to as the Northeast Basin. These subtidal habitats have depths up to -9.0 m chart datum (CD) and are characterized by poor tidal flushing (e.g., Northeast Basin).

The MMRP includes proposed restoration and enhancement works that will be delivered in as follows:

- Stage 1 which provides the initial construction of the MMRP and will be further separated as follows:
  - (a) Creation of habitat within the Northeast Basin as fisheries habitat offsetting for the proposed Centerm Expansion Project (CEP) in Vancouver Harbour (~4.1 ha of habitat for CEP offsetting). While this habitat forms part of the MMRP, details related to this habitat have been included in the *Application for Authorization* (DFO File No. 16-HPAC-00374) for CEP and have therefore not been included in this document.
  - (b) Creation of a subtidal rock reef within the Northeast Basin (~0.4 ha of habitat), the creation of the Southwest Channel rock reef/tidal channel complex (~2.4 ha of habitat), and tidal flushing improvements in the Maplewood Basin that will confer benefits to existing lower value habitats. The subtidal rock reef habitat in the Northeast Basin and the Southwest Channel is surplus to the requirements for habitat offsetting for the CEP ((a) above) and is proposed for deposit into VFPA's Habitat Bank (**Attachment 1**).
- Stage 2 is based on a potential conceptual design but is anticipated to include habitat enhancements in the Main Basin (~11.6 ha) such as intertidal flat habitat, eelgrass habitat and subtidal rock reef habitat.

Stage 1 works are in an advanced design stage, but both Stage 1 and Stage 2 will contribute to the full success of the Project. As part of the overall Project objectives, all habitats have been designed to synergistically provide broad fish habitat benefits within the Maplewood Basin.

The MMRP will result in the creation of high-value habitat types (rock reef, tidal channel, eelgrass, and intertidal flat) that will provide long-term benefits for fishery species that utilize Burrard Inlet, including juvenile salmon, rockfish, Pacific herring (*Clupea pallasii*), and wildlife species.

The key habitat types and ecological functions that the Project will provide, include:

### Intertidal flats

- Habitat for bivalve shellfish (clams).
- Creation of biogenic habitats (barnacle/mussel "reefs") that function as habitat for a variety of commercial, recreational or Aboriginal (CRA) fisheries species.
- Habitat for epifaunal macroinvertebrate CRA fisheries species (e.g., juvenile Dungeness crab (*Metacarcinus magister*)).
- Habitat suitable for infaunal and other invertebrates that provide a source of food for fish.

### **Eelgrass**

- Nursery and rearing habitat for out-migrating juvenile salmonids (e.g., chum salmon (*Oncorhynchus keta*)), marine fish (e.g., Pacific herring), and invertebrates (e.g., Dungeness crab).
- Habitat for other invertebrates that provide a source of food for fish.
- Export of nutrients and organic matter from eelgrass, supporting the marine food web.
- Support of other important abiotic ecosystem services, including filtering water, trapping and binding sediments, baffling wave and current energy, removing contaminants, producing oxygen, sequestering carbon, accelerating nutrient regeneration and regulating nutrient cycles.

### **Rock reef**

- Hard substrates (rock) that support establishment of macroalgae (e.g., broad-bladed kelp) and encrusting sessile invertebrates, providing habitat and food for a broad range of fish (e.g. rockfish and lingcod (*Ophiodon elongatus*)) and invertebrate species.
- Support for other important abiotic ecosystem services, including filtering water, baffling wave and current energy, removing contaminants, producing oxygen, and sequestering carbon.

### **Rock Reef Tidal channel**

- Similar functions to rock reef habitat, through the provision of hard substrates supporting macroalgae and encrusting sessile invertebrates, with habitat values for a broad range of fish and invertebrate species.
- Increased tidal flushing and improved water exchange in the Maplewood Basin with establishment of the Southwest Channel (Stage 1), resulting in multiple benefits for the basin, including:
  - enhanced nutrient transport;
  - improved water quality;
  - reduced siltation of marine vegetation; and
  - enhanced suspension and distribution of marine biota larvae (e.g., pelagic spawning fish and invertebrates), spores (i.e., macroalgae), and seeds (i.e., eelgrass).

The Project will replace existing lower-value fish habitat in the Maplewood Basin, primarily characterized by subtidal mud and areas of wood debris accumulation, with high quality intertidal and shallow subtidal habitats (rock reef, intertidal flats and eelgrass). The new tidal channel (Southwest Channel), which is a key rock reef habitat component, will provide broad-ranging fish habitat productivity improvements within the Maplewood Basin through improved tidal flushing and water exchange. Although the proposed Southwest Channel is located within a broad intertidal flat with coarse substrates (gravel and cobble), productive biogenic habitats (barnacles/mussels (*Mytilus* sp.)) and intertidal bivalve shellfish, modelling results indicate that creation of the proposed tidal channel will reduce average tidal residence time (i.e., increase tidal flushing and improve water exchange) in the Maplewood Basin by approximately 60 percent, conveying productivity improvements to existing lower value habitat and enhancement habitat areas established by the Project.

Project-associated increases in productivity, especially with establishment of the new tidal channel proposed for Stage 1, are anticipated to immediately benefit important fisheries species including out-migrating juvenile salmonids, Pacific herring, Dungeness crab and reef-dwelling fish. Although the time taken for the habitat enhancements to reach full functionality will vary by habitat type, it is anticipated that constructed habitats at the site will become well established within one to three years, and full functionality and productivity can be expected within five years. Establishment of vegetation (macroalgae) and sessile invertebrates on hard substrates (rock reef habitat), ingrowth of eelgrass (eelgrass habitat), and presence of other key indicator species within each habitat type will be recorded through a post-construction monitoring program.

Water feature name:	Maplewood Basin, Maplewood Flats, Burrard Inlet
<b>Location of Works</b>	
Regional district/land use authority:	Vancouver Fraser Port Authority jurisdiction
City/municipality:	District of North Vancouver (DNV)
Lat./Long.	49°18'02.83" N / 123°00'12.69" W
Property ownership:	The Project site is located primarily within VFPA jurisdiction, with minor overlap with a DNV right-of-way (ROW) that intersects the Project Area. VFPA has secured a Licence from DNV for tenure in the area of ROW overlap (entitled "Victor Street") in 2018.
<b>Description of Existing Habitat Values</b>	
<p>The Project is located within and directly adjacent to the previously dredged Maplewood Basin. Subtidal habitats in the Maplewood Basin are primarily characterized by subtidal mud substrates with areas of wood debris accumulation. These subtidal habitats have depths up to -9.0 m CD and are characterized by poor tidal flushing (e.g., Northeast Basin).</p> <p><u>Existing Habitat Values of the Northeast Basin</u></p> <p>Substrates on the historical dredge cut-slopes of the Northeast Basin, which overlap with both existing intertidal and subtidal habitats (+2.5 to -5.0 m CD), become increasingly fine with depth (AECOM 2018, Balanced 2017). The floor of the Northeast Basin is primarily characterized by mud substrates with areas of wood debris, pebble and small amounts of shell. Wood debris reduces habitat quality and productivity (AECOM 2018); it is recognized that such debris can lead to localized anoxia as it decays and is known to adversely affect natural biological processes. Marine vegetation in the Northeast Basin is confined to small areas with rocky substrates and includes sugar kelp (<i>Saccharina latissima</i>) and rockweed (<i>Fucus gardneri</i>). Acorn barnacles (<i>Balanus glandula</i>) and bay mussels (<i>Mytilus trossulus</i>) were commonly observed on coarser substrates at intertidal elevations. Larger crab species, such as Dungeness crab are present, but sparse to rare. The mounded burrow openings of ghost shrimp (Thalassinidea) are present within finer substrates and bivalve shellfish (fat gaper clams (<i>Tresus capax</i>), Nuttall's cockle (<i>Clinocardium nuttalli</i>), butter clam (<i>Saxidomus gigantea</i>), littleneck clam (<i>Protothaca staminea</i>), macoma clam (<i>Macoma nasuta</i>), and manila clam (<i>Venerupis philippinarum</i>)) are present (AECOM 2018, Balanced 2017). Overall fish habitat productivity in the Northeast Basin is impaired by poor tidal flushing, and low availability of high-value habitats (e.g., eelgrass or kelp beds).</p> <p><u>Existing Habitat Values of the Southwest Channel</u></p> <p>The proposed Southwest Channel primarily overlaps with intertidal elevations in the Southern Intertidal Area (<b>Attachment 1</b>), between the southwest corner of the Main Basin and the main channel of Burrard Inlet. Existing substrates consist of mixtures of cobble, gravel, sand and shell hash throughout its elevation range (+2.0 to 0.0 m CD) transitioning to predominantly coarser substrates (cobble and pebble) over a current-swept seafloor within subtidal areas. Sea lettuce (<i>Ulva fenestrata</i>) is locally abundant and occurs in large patches on the southern shorelines. Macroalgae species present within the lower intertidal zone to the south include winged kelp (<i>Alaria esculenta</i>), bull kelp (<i>Nereocystis luetkeana</i>) and red spaghetti (<i>Gracilaria</i> sp.). Sessile invertebrates include acorn barnacles, bay mussels, and Pacific oysters (<i>Crassostrea gigas</i>). The benthic infaunal bivalve community includes fat gaper clam, butter clam, manila clam, Nuttall's cockle, macoma clam, and littleneck clam. Dungeness crab were observed in low abundance, with shore crabs common throughout the intertidal zone. The proposed Southwest Channel overlaps with habitats typified by relatively high densities of acorn barnacles and other sessile organisms. The lower intertidal area is characterized by kelp and macroalgae beds and associated communities. The footprint of the proposed Southwest Channel supports bivalve shellfish throughout, with biomass decreasing with increasing elevation (AECOM 2018, Balanced 2017, Hemmera 2018).</p>	



### Existing Habitat Values of the Main Basin

Substrates within the Main Basin's northern edge are dominated by coarse cobble and gravel, with patches of boulder and concrete debris, between 0.0 m and +5.0 m CD. Low-gradient intertidal flats (0.0 m to +3.0 m CD) border the Main Basin to the east, west, and south (the Southern Intertidal Area), with substrates on these flats consisting of cobble, gravel, and sand, with bands of shell hash throughout. On the historical dredge cut-slopes, subtidal substrates decrease in size with increasing depth with sand and silt dominant on the seafloor (-5.0 m to -8.0 m CD). Marine vegetation includes two small patches of eelgrass (*Zostera marina*) on the northern shoreline between 1.0 m and -2.0 m CD and low overall densities of sugar kelp, rockweed, red fringe (*Smithora naiadum*), red spaghetti, and Turkish washcloth (*Mastocarpus papillatus*). Similar to the Northeast Basin, intertidal areas within the Main Basin support various sessile encrusting invertebrate communities including acorn barnacles and bay mussels. Within subtidal areas, sessile invertebrates including acorn barnacle and giant plumose anemone (*Metridium farcimen*) are present on rocky substrates. Dungeness and graceful crabs are present but considered sparse or rare. Bivalve species present include fat gaper clam, Nuttall's cockle, butter clam, littleneck clam, macoma clam and manila clam (AECOM 2018, Balanced 2017).

The MMRP is proposed for an area that is primarily characterized by subtidal mud dominated habitats with areas of wood debris accumulation and poor tidal flushing resulting in low habitat productivity. The proposed Southwest Channel overlaps with intertidal elevations and mixed substrates consisting of sand, gravel and cobble. Proposed enhancements in the Main and Northeast Basins will result in the creation of productive intertidal flat, eelgrass and rock reef habitat. Coupled with rock reef and tidal channel habitat that will greatly improve tidal exchange and enhance productivity in the basins, the habitat mosaic created by the MMRP will benefit a variety of CRA fisheries species in Burrard Inlet. The Project, at completion, could result in over 18.5 ha of enhanced habitat (Stage 1 and Stage 2), which represents one of the largest habitat enhancement projects in Burrard Inlet.

### Reference sources:

- AECOM. 2018. Centerm Expansion Project - Application for Authorization under Paragraph 35(2)(b) of the Fisheries Act. Section 10. Prepared for the Vancouver Fraser Port Authority.
- Balanced Consulting. 2017. Biophysical Survey – Maplewood Flats, North Vancouver, British Columbia. Prepared for AECOM.
- Hemmera. 2018. Maplewood Marine Restoration Project, Biophysical Sampling Results from the Proposed Southwest Channel. Prepared for the Vancouver Fraser Port Authority.

## Description of Proposed Activities

The Project will involve converting existing subtidal areas within the Northeast Basin and Main Basin to more productive habitats, including intertidal flats, eelgrass and rock reef. These habitat types have specific elevation requirements and habitat enhancement will generally entail infilling of existing subtidal areas to create intertidal and shallow subtidal habitat benches. In addition, some intertidal and shallow subtidal areas within the Southern Intertidal Area will be converted to a tidal channel containing high-value rock reef habitat (i.e., the Southwest Channel) through dredging and rock placement, resulting in improved tidal flushing and water exchange throughout the Maplewood Basin (**Attachment 1**). The Project has been developed in consultation with the Tsleil-Waututh First Nation, who support the proposed enhancement activities which will act to restore fish habitat values within the anthropogenically-modified Maplewood Basin.

The Project is structured to accommodate a two-stage delivery with Stage 1 currently being scheduled for construction in the near future (2019). The advancement of Stage 2 has not been scheduled. Both Stage 1 and Stage 2 are described below.

### Stage 1

As described above, Stage 1 works will include both the Stage 1(a) work associated with CEP offsetting and the Stage 1(b) work for deposit into VFPA's habitat bank. While all Stage 1 work will occur concurrently, the following description provides details for the Stage 1(b) work only which includes construction of rock reef in the Northeast Basin, the enhancement of the Southwest Channel rock reef tidal channel and enhanced tidal exchange in the Maplewood Basin.

Within the Northeast Basin and extending southwards from the toe of the eelgrass habitat bench, rock reef habitat will be created between approximately -3.0 m to -4.0 m CD (see **Attachment 1**). A rock dyke will contain the fill materials needed for construction of the eelgrass habitat bench, with rock placement also extending southward to create additional rock reef habitat area. Rock reef habitat will be at elevations within the photic zone, enabling the growth and persistence of marine vegetation (e.g. macroalgae, including kelps). Rock material used to construct the rock reef habitat will be clean (i.e. free of sediment and dust) and classified as non-acid generating rock. A number of rock reef units will be established, instead of one large homogenous structure. This will involve the placement of small units of rock with soft substrate "channels" between the units. The rock reef habitat will be constructed using rock of varying diameter, with an average (median) diameter ( $D_{50}$ ) of approximately 600 mm. This reflects recommended reef rock size ranges of 200 mm to 500 mm for salmonid rearing habitat and 500 mm to 1,000 mm for rock fish foraging habitat. The reef height will average 1.0 m above the seafloor, with surface elevations ranging between 0.5 m and 1.0 m, establishing a comparable reef height above the seafloor. Rock reef structures will be placed up to 10.0 m apart, to establish "edge" habitat. The total area of the **rock reef habitat** established in the Northeast Basin for habitat banking will be approximately **0.4 ha (Attachment 1)**.

Establishment of the Southwest Channel will involve excavation (via dredging activities) within the Southern Intertidal Area to provide a new connection between the Main Basin and Burrard Inlet (see **Attachment 1**). Following dredging works to the appropriate design elevation, suitably-sized rock material will be placed on the channel sides (revetment) and base to provide for slope protection and rock reef habitat creation (in both areas). The side slope revetment, at an average of 700 mm thick, will be placed at depths ranging from +2.0 m to -4.0 m CD and will comprise rock of various sizes; nominally 350 mm to 750 mm, with  $D_{50}$  of ~500 mm. On the channel base, rock material will occupy 20 m of the 40 m wide channel base and will be placed at depths ranging from +2.0 m to -4.0 m CD. Reef height on the channel base will average 1.0 m above the seafloor, with surface elevations ranging between 0.5 m and 1.0 m. The channel base rock reef habitat will be constructed using rock of varying diameter, with an average (median) diameter ( $D_{50}$ ) of approximately 600 mm. Subtidal portions of the rock reef habitat will be at an elevation that promotes marine vegetation growth. Hard substrates at intertidal elevations (+2.0 to +1.0 m CD) are expected to colonize with dense barnacle and bay mussel beds. With creation of the Southwest Channel, the total **rock reef tidal channel habitat** area established for habitat banking will be approximately **2.4 ha (Attachment 1)**.

## Stage 2

Stage 2 works are at the conceptual planning stages but may include enhancements similar to those proposed for the Northeast Basin, namely intertidal flats, subtidal eelgrass, and rock reef habitats. The objective would be to establish bivalve shellfish, eelgrass, and kelp beds to promote the productivity of specific CRA fisheries species. The Main Basin encompasses approximately 11.6 ha of intertidal and subtidal area and the associated low productivity makes much of the basin suitable and available for enhancement works. The increased tidal flushing provided by the Southwest Channel that is created as part of Stage 1(b) will contribute to increased productivity in the Main Basin immediately, and the creation of high-value habitats as part of Stage 2 will further increase the value of the Main Basin for CRA fisheries species.

All work (i.e. Stages 1 and 2) will be undertaken by marine-access using heavy equipment assisted by barges and support vessels. Construction of Stage 1 is forecast to begin in late summer/early fall 2019 with an anticipated construction period of approximately eight months. The majority of the construction work is scheduled to occur during the appropriate least-risk timing windows for Burrard Inlet. The least-risk timing window to mitigate risk of impacts to juvenile salmonids is August 16th to February 28th. Any work outside the least-risk timing window would occur with appropriate mitigation in place. The Project will be implemented with oversight of an environmental monitor (i.e., a QEP). The development of an Environmental Protection Plan (EPP) by the contractor will provide detailed mitigation measures to be applied during construction operations. The relevant timelines for the proposed activities are summarized below.

Overall work schedule:

**Stage 1 (2019):** Northeast Basin rock reef habitat and Southwest Channel (resulting in rock reef habitat, and immediate and permanent improvements to flushing throughout the Maplewood Basin)

**Stage 2 (TBD):** Additional Main Basin enhancements

Least-risk timing window:	<p>August 16 to February 28 (Fisheries)</p> <p>March 14 to August 16 (Nesting Birds) *</p> <p>*Note: Only a few locations are expected to have potential for nesting birds, primarily at anthropogenic structures on the flats and near the Maplewood Basin (pilings/dolphins). Work can proceed outside of the least-risk timing window if bird nest surveys are conducted and bird nests are not detected. If bird nests are detected then mitigation (e.g., temporary "workarounds") may be required.</p>
<b>Potential Habitat Gains and Anticipated Affected Areas</b>	
<p>Proposed enhancements for the VFPA Habitat Bank include :</p> <ul style="list-style-type: none"> <li>• Creation of rock reef habitat within the Northeast Basin;</li> <li>• Establishment of rock reef tidal channel habitat in the Southern Intertidal Area (the Southwest Channel);</li> <li>• Increased tidal flushing and water exchange throughout the Maplewood Basin; and,</li> <li>• Main Basin enhancements.</li> </ul> <p>The total area proposed for enhancement is approximately 14.4 ha, including approximately 2.8 ha created in Stage 1(b) in the Northeast Basin and Southwest Channel and the remainder of approximately 11.6 ha created in Stage 2.</p> <p>Modelling results indicate that establishment of the Southwest Channel will reduce average tidal residence time (i.e., increase tidal flushing and improve water exchange) in the Maplewood Basin by approximately 60 percent. Increased tidal flushing is expected to enhance nutrient transport, improve water quality, reduce siltation of marine vegetation, facilitate suspension and distribution of eggs and larvae of pelagic spawning fish and invertebrates along with marine vegetation spores, and provide improved connectivity for fish (including juvenile Pacific salmon and Pacific herring) over a broad range of tidal conditions. This will provide notable benefits to the Maplewood Basin. For the purposes of habitat banking, increased water exchange will result in increases in fish habitat productivity. This increase in productivity needs to be recognized as a distinct benefit that the Southwest Channel will contribute to the Project. Although habitat banking "credit" is not calculated for this water exchange and productivity improvement, the "gain" is reflected in the use of relative habitat values modified to take this effect into account.</p> <p>New habitats (habitat gains) are summarized in the table below, as well as the anticipated affected areas (habitat losses) associated with the habitat enhancement.</p> <p>Relative values (RV) included in the table below are consistent with the approach taken in the CEP <i>Fisheries Act</i> Authorization (FAA) Application relevant to the Northeast Basin, with some adaptations incorporated for specific habitat features and with consideration towards specific broad habitat enhancement benefits (e.g., Southwest Channel contributing to increased flushing in the Maplewood Basin). The following provides an overview summary of calculations included in this table:</p> <ul style="list-style-type: none"> <li>• 0.167 – Relative values and conversion ratios presented are consistent with CEP FAA approach, with relative value of 0.5 for Northeast Basin existing seafloor ("subtidal mud") and relative value of 3 for proposed rock reef habitat in Stage 1 (<math>0.5:3 = 1:6 = 0.167</math>).</li> <li>• 0.6 – Relative value of 3 for existing intertidal flats at the Southern Intertidal Area and relative value of 5 for the proposed Southwest Channel habitats in Stage 1(b). The relative value for the rock reef tidal channel was assigned, in consideration of extensive, broad-ranging, and permanent habitat productivity benefits to the entire Maplewood Basin that will result from tidal channel construction and the habitat types that will be created in the Southwest Channel (i.e. tidal channel rock reef). The relative value ratio of 3:5 leads to the 0.6 conversion factor. Existing intertidal flat was allocated the same relative value rating as the proposed intertidal flat habitat to be created in the Northeast Basin for consistency, with overall ratio of 3:5 considered appropriate for calculating overall productivity benefits.</li> </ul>	



Stage	Habitat Type	Loss or Gain	Relative Value (RV)	Calculation	Area (m <sup>2</sup> )
1(b)	Gross rock reef habitat created in Northeast Basin: (gross area of rock reef) x (RV of rock reef)	Gain	1.0	4,338 m <sup>2</sup> x 1.0	<b>+4,338</b>
	Loss of subtidal mud due to rock reef conversion	Loss	0.167	4,338 m <sup>2</sup> x 0.167	<b>- 724</b>
	Net value for subtidal mud to rock reef conversion	Gain	--	4,338 m <sup>2</sup> – 724 m <sup>2</sup>	<b>+3,614</b>
1(b)	Gross rock reef tidal channel habitat created in Southern Intertidal Area: (gross area of tidal channel) x (RV of tidal channel)	Gain	1.0	24,000 m <sup>2</sup> x 1.0	<b>+ 24,000</b>
	Loss of intertidal flats due to tidal channel conversion	Loss	0.60	24,000 m <sup>2</sup> x 0.60	<b>-14,400</b>
	Net value for intertidal flats to rock reef tidal channel conversion	Gain	--	24,000 m <sup>2</sup> – 14,400 m <sup>2</sup>	<b>+9,600</b>
<b>1(b)</b>	<b>Net credits in Stage 1(b) (rock reef) + (rock reef tidal channel)</b>			<b>3,614 m<sup>2</sup> + 9,600 m<sup>2</sup></b>	<b>+ 13,214</b>
Stage	Habitat Type	Loss or Gain	Relative Value (RV)	Calculation	Area (m <sup>2</sup> )
2	Gross habitat to be created in Main Basin: (gross area of habitat type to be created in Main Basin) x (RV of habitat type)	Gain	TBD	TBD m <sup>2</sup> x TBD	<b>TBD</b>
2	Loss of subtidal mud due to habitat enhancement	Loss	TBD	TBD m <sup>2</sup> x TBD	<b>TBD</b>
2	Net value for subtidal mud to habitat enhancement	Gain	--	TBD m <sup>2</sup> - TBD	<b>TBD</b>
<b>2</b>	<b>Net credits in Stage 2</b>		<b>--</b>	<b>TBD</b>	<b>TBD</b>

Detailed habitat credit deposits for Stage 1 will be based on as-built survey information and calculations following completion of construction. Calculations of as-built area of rock reef habitat will take into account three dimensional considerations inherent in reef designs. Net credits and habitat balance for Stage 2 will be determined after consultation and design development depending on habitat types to be constructed.

### Fish Productivity Investment Policy Considerations

Provided below is a high-level summary of how the Project is expected to comply with Fisheries Productivity Investment Policy (FPIP) objectives, based on Project characteristics, ecology of relevant fisheries species, fisheries management objectives, and any local restoration priorities. This includes a review of readily available online information for Pacific salmon, Pacific herring, and Dungeness crab. Materials reviewed include the *Southern Pacific Salmon Integrated Fisheries Management Plan Summary for Genus Oncorhynchus – 2014/15* (DFO 2015), *Pacific Herring Integrated Management Plan Summary – 2013/14* (DFO 2014) and *Integrated Fisheries Management Plan Summary – Crab by Trap, Pacific Region – January 1st to December 31st, 2015* (DFO 2015).

- **Principle 1: Offsetting measures must support fisheries management objectives or local restoration priorities.** Stage 1(b) of the Project will result in the creation of nearshore rock reef

habitat in Burrard Inlet and Stage 2 may include the creation of intertidal flat habitat, eelgrass habitat and nearshore rock reef habitat. Of these habitat types, eelgrass is a habitat type that has been extensively damaged and lost over time with human development. Nearshore rock reef habitat within the Northeast Basin (Stage 1) and intertidal flat, eelgrass and nearshore rock reef habitat within the Main Basin (Stage 2) will convert existing lower value habitats (subtidal mud) to higher value habitats of benefit to CRA fisheries species. Prior to development and dredging in the area, Maplewood Flats was reported to support significant eelgrass and kelp bed habitats and was an important shellfish harvesting site for Aboriginal groups. As the Project area was identified as a restoration priority for Aboriginal groups, habitat enhancement and restoration within the Maplewood Basin will continue to be advanced in consultation with these groups.

Construction of the Southwest Channel will result in the establishment of a tidal channel that will benefit other Project components (both Stages) and more broadly the entire Maplewood Basin (Main Basin and Northeast Basin). While tidal channel creation will result in the conversion of existing intertidal flats, improvements in tidal flushing and water exchange are highly desirable to the entire habitat mosaic (existing and enhanced) at the Project site. Support for these benefits (and for potential future restoration works) have been expressed by the Tsleil-Waututh Nation.

Chum and pink salmon (*Oncorhynchus gorbuscha*) are the Pacific salmon fisheries species/stocks expected to benefit the most from the Project, as out-migrating juveniles traverse nearshore areas of Burrard Inlet on their seaward migration. Some rearing habitat benefits are also expected for out-migrating juvenile chinook (*Oncorhynchus tshawytscha*) and coho salmon (*Oncorhynchus kisutch*). Macroalgae supported by rock reef creation and eelgrass habitat creation will provide spawning substrates for potential use by Pacific herring. Intertidal flat habitat will provide productive areas for infaunal invertebrates and macroinvertebrates, resulting in an improved habitat mosaic that benefits juvenile Pacific salmon and other CRA fisheries species. Both rockfish and lingcod are expected to directly benefit from the establishment of rock reef habitats. Furthermore, crab species which support important fisheries (i.e., Dungeness and red rock crabs) will directly benefit from the Project. Eelgrass provides important habitat for a variety of different Dungeness crab life history stages, including nursery habitat for young-of-year crabs and refuge habitats for older crabs when they molt. Rock reefs provide important habitat values for a wide range of red rock crab life history stages.

Although construction of the Southwest Channel will result in the conversion of existing intertidal flats with productive bivalve shellfish beds, these clams are within an area that is presently closed to fishing and does not notably contribute to CRA fisheries within the regional setting. Immediately after construction, the new tidal channel will substantially enhance a broad range of CRA fisheries species that are actually contributing to existing fisheries within Burrard Inlet and its tributary streams.

As a result, the Project will support conservation of these various species/stocks and will help meet ongoing restoration priorities of improving the shallow subtidal habitats upon which these juvenile Pacific salmon, adult Pacific herring and crab (Dungeness and red rock) depend for key life history stages.

- **Principle 2: Benefits from offsetting measures must balance Project impacts.** This principle is not applicable to the development stages of the VFPA Habitat Bank. Although the Project is associated with offsetting proposed for the CEP, the habitat creation works described in this document are surplus to what is required as offsetting and are proposed for deposit to the VFPA Habitat Bank. Determinations regarding appropriate offsetting for other (future) project-related effects (e.g. use of habitat bank credits) are subject to DFO review and agreement at a future date, including relevant consultation with Aboriginal groups.
- **Principle 3: Offsetting measures must provide additional benefits to the fishery.** The Project will provide additional benefits to Pacific salmon fisheries, rockfish, lingcod, forage fish (fish that support fisheries), and crab (Dungeness and red rock) fisheries. Creation of the Southwest Channel will improve flushing and water exchange in Maplewood Basin, without notably impacting any existing fisheries (i.e., existing productivity for bivalve shellfish does not currently benefit CRA fisheries). Establishment of new rock reef and eelgrass habitats improve productivity within this portion of Burrard Inlet, directly benefiting out-migrating juvenile Pacific salmon. New rock reef habitats will also directly benefit rockfish and lingcod. Improvements to the quantity and quality of suitable spawning habitats for Pacific herring will help support the herring fishery and benefit other fisheries for species which forage

on herring (e.g., Pacific salmon). Furthermore, new rock reef and eelgrass habitats will provide additional high-value habitat for a range of different crab life history stages.

- **Principle 4: Offsetting measures must generate self-sustaining benefits over the long-term.** The Project will add highly productive habitats benefiting finfish and other fisheries species in the short-term, with substantial benefits to be realized over the long-term without any anticipated maintenance needs or other forms of intervention. The Project will be constructed following a final design developed by a qualified team of multi-disciplinary specialists, with input from Aboriginal groups. The Project team has considerable experience in the successful establishment of similar projects. The constructed habitats are designed to be self-sustaining, with consideration towards a variety of factors including: site characteristics; type of constructed habitat; and the historical success of similar projects within Burrard Inlet.

-----  
Reference sources:

DFO. 2014. Pacific Herring (*Clupea pallasii*) Integrated Management Plan Summary

DFO. 2015. Southern Pacific Salmon Integrated Fisheries Management Plan Summary for Genus *Oncorhynchus*.

DFO. 2015. Integrated Fisheries Management Plan Summary – Crab by Trap, Pacific Region – January 1st to December 31st, 2015.

## Post-Construction Monitoring Plan

Consistent with other completed HEP projects, an as-built survey will be performed to document and confirm the size of the created habitat, following construction. Record drawings will be prepared based on this survey.

VFPA will ensure that post-construction monitoring is undertaken in accordance with standard DFO requirements to confirm that created fish habitats are functioning as intended. A Post-Construction Monitoring Plan for the Habitat Enhancement Program has been created to outline monitoring requirements for habitat enhancement sites and includes habitat types that are associated with the Project. Monitoring will include assessments of site stability, proper physical function, planting success, establishment of marine vegetation and achievement of the desired biological objectives.

Based upon the establishment of similar habitat enhancement projects in Burrard Inlet and elsewhere within southwestern British Columbia, it is anticipated that constructed habitats at the site will become well established within one to three years following construction.

## Attachments

- Attachment 1 – Summary of Habitat Areas for the Maplewood Marine Restoration Project

Signed on behalf of Vancouver Fraser Port Authority:



**Charlotte Olson, P.Geo., PMP**  
Manager, Infrastructure Habitat Development  
Habitat Enhancement Program  
Vancouver Fraser Port Authority

Date: March 4, 2019



Maplewood Marine Restoration Project  
North Vancouver, BC

**Attachment 1**  
**Summary of Habitat Areas for the**  
**Maplewood Marine Restoration Project**

**Legend**

- Stage 1(a) CEP Offsetting Habitat Area
- Stage 1(b) Habitat Area Proposed for VFPA Habitat Bank
- Stage 2 Habitat Enhancement Area

**Northwest Basin**

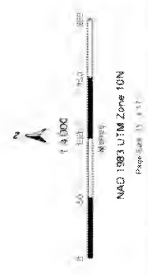
- Intertidal Flat
- Seagrass
- Shore Reef
- Southwest Channel
- Rock Reef

**Notes**

- All mapped features are approximate and should be used for discussion purposes only.
- This map is not intended to be a "stand-alone" document, but a visual aid to the information contained within the referenced report. It is intended to be used in conjunction with the report and should not be used to make decisions.

**Sources**

- Project Boundary, Basin, Channel and Proposed Enhancement Features: AECOM, 2018
- Maplewood Marine Restoration Project: North Vancouver, 2013
- Inset Basemap: Esri World Topographic Map



Production Date: Dec 12, 2018



## Nutton, Byron

---

**From:** Olson, Charlotte <Charlotte.Olson@portvancouver.com>  
**Sent:** 2019–March-11 9:49 AM  
**To:** Nutton, Byron; Thorpe, Suzanne  
**Cc:** Ruffo, Gord; Scott Northrup  
**Subject:** RE: Assisted Assessment - Maplewood - supplement to support Project Confirmation  
**Attachments:** 2019-03-04-03-200-HEM-MMRP QEP Assisted Assessment-Rev0\_Final.pdf

Per my note below, attached is the supplementary supporting document "MMRP QEP Assisted Assessment"

Regards,  
Charlotte

**From:** Olson, Charlotte  
**Sent:** Monday, March 11, 2019 9:46 AM  
**To:** 'Nutton, Byron' <Byron.Nutton@dfo-mpo.gc.ca>; Thorpe, Suzanne <Suzanne.Thorpe@dfo-mpo.gc.ca>  
**Cc:** Ruffo, Gord <Gord.Ruffo@portvancouver.com>; Scott Northrup <snorthrup@hemmera.com>  
**Subject:** Project Confirmation - Maplewood - FOR DFO REVIEW  
**Importance:** High

Good morning Byron and Suzanne,  
As discussed last Thursday, please find attached:

- Project Confirmation for the Maplewood Marine Restoration Project

We are looking forward to your review, and our discussion this Thursday at 11:30am.

Due to file size, note that in a separate email I will be providing the QEP Assisted Assessment, as supplementary documentation for your review if helpful.

Regards,  
Charlotte

**Charlotte Olson** P.Geo., PMP  
Manager, Infrastructure Habitat Development



**Vancouver Fraser Port Authority**  
100 The Pointe, 999 Canada Place  
Vancouver, B.C. Canada V6C 3T4

P: 604.665.9590 | CELL: 604.349.4111  
[portvancouver.com](http://portvancouver.com)



# MAPLEWOOD MARINE RESTORATION PROJECT

Assisted Assessment of Serious Harm for Habitat  
Banking Elements (Stages 1(b) and 2)



Photo Credit: Veltus Promotional Media (2018)

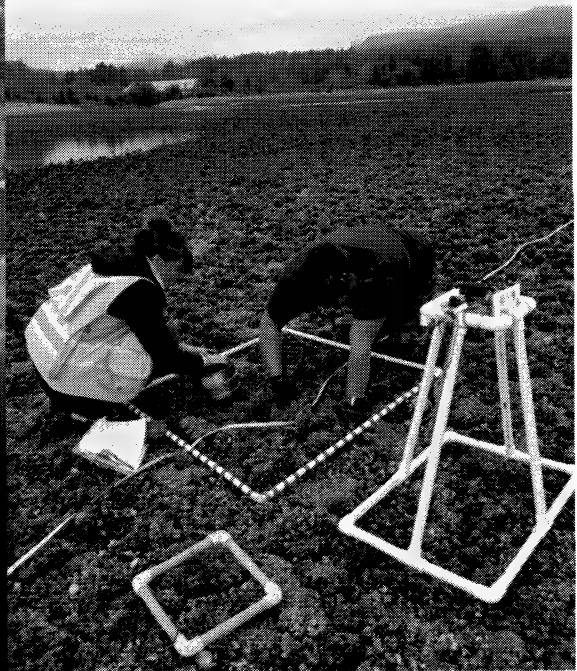


Photo Credit: Hemmera (2018)

**Prepared for:**

**Vancouver Fraser Port Authority**  
100 The Pointe, 999 Canada Place  
Vancouver, BC V6C 3T4

Project No. 989565-05

**Prepared by:**

**Hemmera Envirochem Inc.**  
18th Floor, 4730 Kingsway  
Burnaby, BC V5H 0C6  
T: 604.669.0424  
F: 604.669.0430  
hemmera.com

March 4, 2019

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APPENDICES

Appendix A	Southwest Channel Biophysical Sampling Report
Appendix B	Construction Environmental Management Plan



## LIST OF ACRONYMS AND ABBREVIATIONS

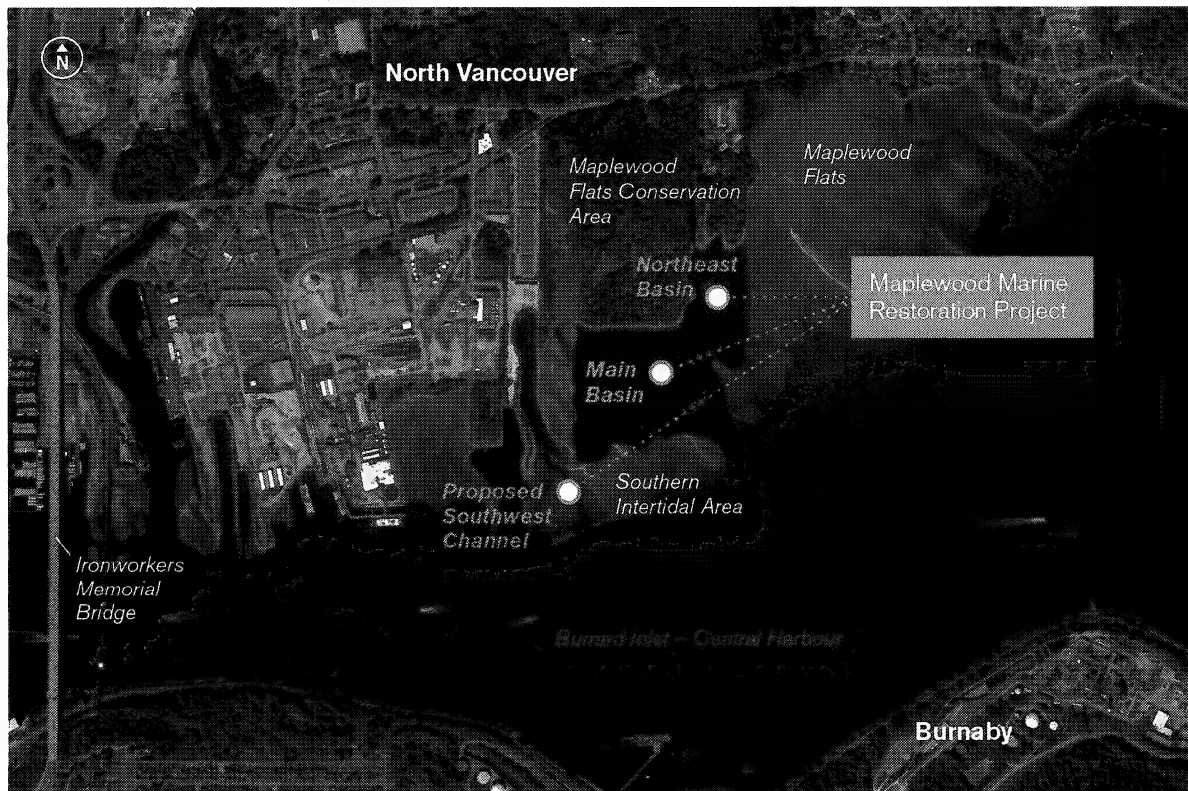
Acronym / Abbreviation	Definition
Balanced	Balanced Environmental Services Inc.
CD	Chart Datum
CEMP	Construction Environmental Management Plan
CEP	Centerm Expansion Project
CRA	commercial, recreational or Aboriginal (in the context of a fishery or fish species)
D <sub>50</sub>	mass median diameter
DFO	Fisheries and Oceans Canada
FA	<i>Fisheries Act</i>
FPP	Fisheries Protection Policy
Glenrose	Glenrose Tidal Marsh Project
ha	hectares
Hemmera	Hemmera Envirochem Inc.
HEP	Habitat Enhancement Program
MMRP	Maplewood Marine Restoration Project
Project	Maplewood Marine Restoration Project
QEP	Qualified Environmental Professional
Serious Harm	serious harm to fish [as defined under the <i>Fisheries Act</i> ]
SARA	<i>Species at Risk Act</i>
SIA	Southern Intertidal Area
TWN	Tselil-Waututh Nation
VFPA	Vancouver Fraser Port Authority

## 1.0 INTRODUCTION

The Maplewood Marine Restoration Project (MMRP, or the “Project”) is a habitat enhancement project proposed by the Vancouver Fraser Port Authority (VFPA) Habitat Enhancement Program (HEP). HEP is a VFPA program whose goal is to balance a healthy environment with infrastructure development opportunities.

The Project was identified as a restoration priority by Tsleil-Waututh Nation (TWN), with a specific request to establish a process between TWN and VFPA that enabled a collaborative design development process for MMRP. Through this process, VFPA has sought to ensure alignment between existing and future habitat enhancement priorities identified by Aboriginal groups, such as TWN.

MMRP lies within VFPA's jurisdiction on the north shore of Burrard Inlet to the south of the Maplewood Flats Conservation Area, approximately two kilometres east of the Iron Workers Memorial Bridge and Second Narrows in North Vancouver, BC. The Project area includes the existing Maplewood Basin, a previously dredged area encompassing the Main Basin (~11.6 hectares (ha)) and Northeast Basin (~4.5 ha), and the proposed Southwest Channel (~2.4 ha) located in the Southern Intertidal Area (SIA) at the southwestern end of the Main Basin (**Figure 1-1**).



**Figure 1-1** Location of the MMRP Site Along the North Shore of Burrard Inlet (Base Image: Google Earth 2017, Annotation: Kirk & Co. 2019)

To ensure compliance with the *Fisheries Act* (FA) and aquatic species provisions under the *Species at Risk Act* (SARA), Fisheries and Oceans Canada's (DFO's) Fisheries Protection Program is responsible for the review of proposed works, undertakings, and activities that may affect fish and fish habitat. DFO provides a list of criteria to determine if a proposed project requires regulatory review to assess its potential to result in *serious harm to fish* (Serious Harm), which is defined as "the death of fish or any permanent alteration to, or destruction of, fish habitat". Proponents of projects near water are encouraged to conduct a self-assessment of proposed project activities to determine if they can avoid or mitigate impacts to fish and fish habitat, such that the project does not result in Serious Harm. If a proponent determines through the self-assessment process that they cannot avoid or mitigate impacts to fish and fish habitat, a request for review would need to be submitted to DFO.

Consistent with the approach taken for other VFPA habitat enhancement projects, the following document was developed by Qualified Environmental Professionals (QEPs) to provide VFPA with an Assisted Assessment of Serious Harm for MMRP. As described in **Section 2.1** of this document, this Assisted Assessment applies only to Stage 1(b) and Stage 2 of MMRP. Stage 1(a) works are addressed under the FA Authorization for the Centerm Expansion Project (CEP), issued on November 14, 2018. The following assessment is guided by information presented in DFO's Projects Near Water website (DFO 2018), the Fisheries Protection Policy (FPP) Statement (DFO 2013a), and the Fisheries Productivity Investment Policy (DFO 2013b). This assessment is also based on consideration of DFO's "Science Advice for Managing Risk and Uncertainty in Operational Decisions of the Fisheries Protection Program" (DFO 2014a).

## 2.0 PROJECT OVERVIEW

### 2.1 Project Staging

Restoration and enhancement work for MMRP is proposed to be implemented in two stages (Stage 1[a and b], and Stage 2), as described below and as depicted in **Figure 2-1**:

- Stage 1 includes the initial construction of MMRP, with habitat components further separated into Stages 1(a) and 1(b) as follows:
  - Stage 1(a) consists of creation of approximately 4.1 ha of enhanced fish habitat in the Northeast Basin in the form of: intertidal flats; an eelgrass bed; and, subtidal rock reef habitat. This habitat will be used as a direct fish habitat offset for CEP in Vancouver Harbour. While this habitat forms part of MMRP, an Authorization for construction of this habitat as an offset for CEP was provided by DFO in November 2018 (DFO File No. 17-HPAC-00374).<sup>1</sup> Therefore, as this portion of MMRP has already been authorized, Stage 1(a) of MMRP will not be included as part of this Assisted Assessment of Serious Harm.
  - Stage 1(b) consists of creation of additional rock reef habitat within the Northeast Basin (~0.4 ha of habitat), creation of the Southwest Channel rock reef/tidal channel complex (~2.4 ha of habitat), and tidal flushing improvements (i.e., reduction in the residence time of marine waters) throughout the Maplewood Basin (particularly with respect to the Main Basin (~11.6 ha)) that will confer benefits to existing lower value habitats. The primarily subtidal rock reef habitat created in the Northeast Basin and the Southwest Channel as part of Stage 1(b) are proposed for deposit into VFPA's Habitat Bank. The habitat benefits resulting from increased tidal flushing in the Main Basin will be recognized for habitat credit during Stage 2 of the Project. Habitat proposed for VFPA's Habitat Bank will be deposited in accordance with the 2012 working agreement between VFPA and DFO entitled "Working Agreement Concerning Procedures for Development and Operation of the Port Metro Vancouver Habitat Bank". An assessment for creation of this additional rock reef habitat has been included as part of this Assisted Assessment of Serious Harm.
- Stage 2 consists of the creation of habitat enhancement features in the Main Basin. Stage 2 is at a conceptual design stage, but it is anticipated to involve similar habitat enhancement features as those proposed for the Northeast Basin in Stage 1. Creation of habitat in the Main Basin (~11.6 ha) may include intertidal flat, eelgrass bed and rock reef habitat. An assessment for creation of these habitat areas has been included in this Assisted Assessment of Serious Harm for MMRP.

<sup>1</sup> Details related to CEP offsetting was provided to DFO by VFPA in a February 2018 submission for an Application for Authorization under Paragraph 35(2)(b) of the FA (AECOM 2018a). Supplemental information for the application was also provided by VFPA in May, July, and August 2018. As stated in the issued Authorization, the habitat offsetting measures for CEP are to be completed by December 31, 2020.



Maplewood Marine Restoration Project  
North Vancouver, BC

### Summary of Habitat Areas for the Maplewood Marine Restoration Project

#### Legend

- Stage 1(a) CEP Offsetting Habitat Area
- Stage 1(b) Habitat Area Proposed for VFPA Habitat Bank
- Stage 2 Habitat Enhancement Area

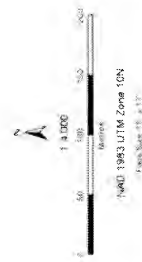
- Intertidal Flat
- Emergent
- Rock Reef
- Southwest Channel
- Rock Reef

#### Notes

1. All mapped features are approximate and should be used for discussion purposes only.
2. This map is not intended to be a "stand-alone" document. It is a visual aid of the information contained within the referenced report. It is intended to be used in conjunction with the scope of services and limitations described therein.

#### SOURCES

- Project Boundary, Banks, Channel and Proposed Enhancement Features: AECOM, 2018
- Maplewood Marine Restoration Project: 2013
- Inset Basemap: EGR World Topographic Map



89565-05 Production Date: Mar 1, 2019 Figure 2-1

**Hemmera**  
an Aquatic Systems

**PORT OF VANCOUVER**

## 2.2 Stage 1(b) Habitat Enhancements

Stage 1(b) of MMRP includes the creation of approximately 2.8 ha of rock reef habitat combined in the Northeast Basin (~0.4 ha) and proposed Southwest Channel (~2.4 ha). Creation of rock reef habitats will occur at a key location in Burrard Inlet, which is an important marine habitat area for out-migrating juvenile Pacific salmon (e.g., chum (*Oncorhynchus keta*)) and other important commercial, recreational, or Aboriginal (CRA) fisheries species (e.g., rockfish, lingcod (*Ophiodon elongatus*), Pacific herring (*Clupea pallasii*), and Dungeness crab (*Metacarcinus magister*)). Rock reef habitat creation is anticipated to benefit a variety of life stages of a range of CRA fish, thus aligning with DFO's goal of maintaining or improving the productivity of CRA fisheries (AECOM 2018b).

Subtidal portions of the rock reef habitats will be at elevations within the photic zone, promoting the growth and persistence of marine vegetation (e.g., macroalgae, including kelps). Intertidal rock reef habitat is expected to colonize with dense barnacle and mussel beds.

Creation of rocky reef-macroalgal habitat provides direct benefits to fish by increasing the availability of three-dimensional contiguous refuge, nursery, forage, and spawning habitats. However, there are also many secondary benefits to fish. As described by AECOM (2018a), rock reef habitat provides increased:

- Primary productivity;
- Detrital contribution to nearby habitats and food webs;
- Ecological efficiency (i.e., less energy used for foraging or predator avoidance);
- Coastal stabilization and erosion protection;
- Carbon storage and oxygen production; and
- Nutrient cycling.

The "edge" or ecotone habitat (i.e., habitat that forms in areas between and around rock reef structures) is also reported to provide enhancements between 3 to 20 m away from reefs (AECOM 2018c). These edge habitats between the rock reef structures also improve tidal flushing, thereby increasing food and oxygen availability and light penetration around developing kelp beds (AECOM 2018c).

In addition to the habitat values resulting from creation of rock reef habitat, construction of the Southwest Channel is also anticipated to substantially improve tidal flushing and water exchange throughout the Maplewood Basin. There are many benefits to fish from increased tidal flushing including: enhancement of nutrient transport; improved water quality; reduced siltation of marine vegetation; and, increased suspension and distribution of eggs and larvae of pelagic spawning fish and invertebrates, as well as marine vegetation spores (AECOM 2018c). As supported by hydrodynamic modelling undertaken for Stage 1 of MMRP, increased tidal flushing resulting from construction of the Southwest Channel during Stage 1(b) of MMRP is also expected to confer many benefits to fish in the Main Basin during implementation of Stage 2 of MMRP (VFPA 2018).

Based on decades of similar marine restoration work undertaken within Burrard Inlet, other locations within southwestern British Columbia, and elsewhere in the Pacific Northwest, rock reef construction is understood to be a reliable, proven habitat enhancement technique. Once physical construction of the rock reef habitat is complete, the rock will naturally colonize with macroalgae (e.g., broad-bladed kelp) and sessile



invertebrates (e.g., barnacles and mussels). It is anticipated that constructed habitats at the site will become well established within one to three years, and full functionality and productivity can be expected within five years. Design plans for Stage 1(b) of MMRP have been developed by a qualified team of multi-disciplinary specialists, including coastal engineers, indicating that there will be dependable results with respect to anticipated improvements in fish habitat value. These rock reefs will contribute to the overall fish habitat mosaic in Burrard Inlet, and within the Maplewood Flats and Maplewood Basin areas.

### 2.3 Construction Methodology

As described above, Stage 1 works will include both the Stage 1(a) work associated with CEP offsetting, and the Stage 1(b) work for deposit into VFPA's habitat bank. While all Stage 1 work is anticipated to occur concurrently, the following description provides construction details for the Stage 1(b) work only, which includes construction of rock reef habitat in the Northeast Basin and construction of the Southwest Channel rock reef tidal channel.

Within the Northeast Basin and extending southwards from the toe of the eelgrass habitat bench (part of Stage 1(a)), rock reef habitat will be created between approximately -3.0 m to -4.0 m Chart Datum (CD). A rock dyke will contain the fill materials needed for construction of an eelgrass habitat bench, with rock placement extending southward to create additional rock reef habitat area. Rock material used to construct the rock reef habitat will be clean (i.e., free of sediment and dust) and classified as non-acid generating rock. A number of rock reef units will be established, instead of one large homogenous structure. This will involve the placement of small units of rock with soft substrate "channels" between the units. The rock reef habitat will be constructed using rock of varying diameter, with a mass median diameter ( $D_{50}$ ) of approximately 600 mm. This reflects recommended reef rock size ranges of 200 mm to 1,000 mm. The reef height will average 1.0 m above the seafloor, with varying surface elevations ranging between 0.5 m and 1.0 m, to increase habitat diversity. Rock reef units will be placed up to 10.0 m apart, to establish edge habitat (AECOM 2018b).

Establishment of the Southwest Channel will involve excavation (via dredging activities) within the SIA to provide a new connection between the Main Basin and Burrard Inlet. Following dredging works to the appropriate design elevation, suitably-sized rock material will be placed on the channel sides (revetment) and base to provide for slope protection and rock reef habitat creation (in both areas). The side slope revetment, at an average thickness of 700 mm, will be placed at depths ranging from +2.0 m to -4.0 m CD and will comprise rock of various sizes; nominally 350 mm to 750 mm in diameter, with a  $D_{50}$  of ~500 mm. Rock material will occupy 20 m of the 40 m wide channel base and will be placed at -4.0 m CD. Reef height on the channel base will average 1.0 m above the seafloor, with surface elevations ranging between 0.5 m and 1.0 m. The channel base rock reef habitat will be constructed using rock of varying diameter, with a  $D_{50}$  of approximately 600 mm (AECOM 2018b).

All work (i.e., Stages 1 and 2) will be undertaken by marine-access using heavy equipment assisted by barges and support vessels. The Project will be implemented with oversight of an Environmental Monitor (i.e., a QEP). The relevant timelines for the proposed activities are summarized in **Section 2.4** below.

## 2.4 Construction Scheduling

Access by large marine construction equipment (e.g., loaded barges) to the Main Basin and the Northeast Basin is currently subject to tide heights. As was outlined in the CEP Application for Authorization (AECOM 2018a), the Southwest Channel will be created in parallel with habitat creation efforts in the Northeast Basin. This allows construction-supporting vessels access to the Maplewood Basin during any tidal condition, thereby increasing scheduling flexibility (VFPA 2018) and substantially shortening the overall construction schedule and potential short-term effects of Project construction on fish and fish habitat. Construction of the Southwest Channel will also facilitate future access for construction of Stage 2 enhancements. Along with facilitating site access, dredged material from construction of the Southwest Channel (Stage 1(b)) will be used beneficially in construction of habitat in the Northeast Basin.

VFPA intends to construct Stages 1(a) and (b) of MMRP concurrently, with construction of Stage 2 anticipated in the future. Any future enhancements (e.g., Stage 2) would be subject to design development, appropriate permitting, and consultation with Aboriginal groups, consistent with the work completed to date. TWN has expressed continued support for the inclusion of the Southwest Channel in the construction of MMRP, recognizing the expected benefits to restoration initiatives in the area. The habitat benefits from construction of the Southwest Channel are outlined in more detail in **Section 2.2**.

Construction of Stage 1 is forecast to begin in late summer/early fall 2019 with an anticipated construction period of approximately eight months. The majority of the construction work, including all dredging activities in the Southwest Channel, is scheduled to occur during the appropriate least-risk fisheries timing window for Burrard Inlet. The least-risk timing window, designed to mitigate risk of impacts to juvenile salmonids, is August 16<sup>th</sup> to February 28<sup>th</sup>. Any work outside the least-risk timing window would occur with appropriate mitigation in place. Construction of Stage 1 of MMRP is to be completed by December 31, 2020 to align with the CEP FA Authorization requirement (DFO File No. 17-HPAC-00374).



### 3.0 EXISTING BIOPHYSICAL CONDITIONS

In the late 1800s, tidal flats bordered the northern shore of Burrard Inlet's Central Harbour providing productive habitat for waterfowl, fish, and shellfish. Dredging of the Maplewood Basin (i.e., the Main Basin and Northeast Basin) in the mid-1900s for gravel extraction resulted in the conversion of approximately 17 ha of intertidal habitat into subtidal areas for industrial uses including log sorting and storage. Infilling of dredged areas around the 1970s reclaimed some upland areas along the north side of the Main Basin and Northeast Basin (Hemmera 2018b<sup>2</sup>). As a result of the historic dredging and industrial operations, the existing subtidal areas in the Maplewood Basin are considered relatively isolated, with the northern and central portions of the Maplewood Basin being poorly flushed (AECOM 2018a).

To assess existing biophysical conditions at the MMRP site, Balanced Environmental Services Inc. (Balanced) implemented underwater dive and land-based surveys of the MMRP site (including the Northeast Basin, proposed Southwest Channel, and the Main Basin) between October 18 and 20, 2017. The surveys assessed surficial substrate, marine vegetation, faunal composition and abundance, and general habitat characteristics. Bivalve surveys were also conducted by Balanced on October 27, 2017 to collect information on species presence and abundance throughout the Maplewood Basin and the SIA (Balanced 2017). Subsequent to these surveys, Hemmera Envirochem Inc. (Hemmera) conducted a supplemental biophysical assessment focused on the portion of the SIA overlapping the proposed Southwest Channel. This assessment, undertaken during a low tide on June 14, 2018, characterized substrate composition, dominant habitat types, and bivalve shellfish presence and density within the proposed Southwest Channel footprint (**Appendix A**).

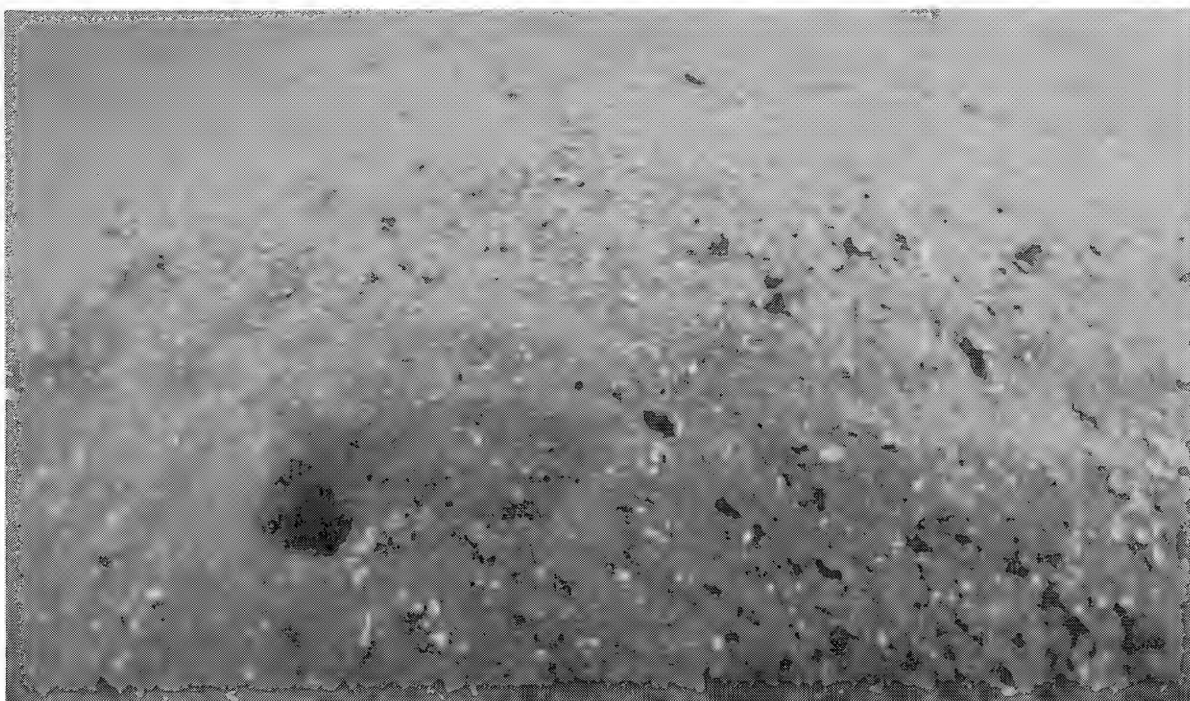
A short summary of the existing biophysical conditions as they relate to the Maplewood Basin and SIA habitats overlapping Stage 1(b) and Stage 2 of MMRP, is provided in the subsections below. Existing conditions in the Northeast Basin and proposed Southwest Channel are described in more detail in the Existing Ecological Conditions Report for Stage 1 of MMRP (Hemmera 2018b). While the Existing Ecological Conditions Report focuses on areas overlapping Stage 1 of MMRP, conditions in the Main Basin (i.e., areas overlapping Stage 2 of MMRP) are also described, with additional details provided in the 2017 Balanced report (Appendix B of Hemmera 2018b).

#### 3.1 Maplewood Basin: Northeast Basin and Main Basin

Substrates along the historical dredge cut-slopes in the Maplewood Basin become increasingly fine with depth. The relatively deep subtidal floor of the Maplewood Basin (reaching depths up to approximately -10 m CD) is characterized primarily by sand, silt, and mud substrates with some woody debris, pebble and small amounts of shell hash present. Woody debris, which can adversely affect benthic habitat quality and productivity due to localized anoxia (e.g., adversely affecting reproduction of Dungeness crab), has accumulated within the historic dredge basins over decades of log-handling operations (Balanced 2017; AECOM 2018c; VFPA 2018).

<sup>2</sup> The Existing Ecological Conditions Report for Stage 1 of MMRP is available online at <https://www.portvancouver.com/wp-content/uploads/2018/08/Attachment-03-MMRP-Ecological-Conditions-Report-July-2018.pdf> (Hemmera 2018b).

The fine substrates present at the base of the Maplewood Basin (**Photo 3-1**), provide few attachment opportunities for marine vegetation or encrusting invertebrates (VFPA 2018). However, the shallow subtidal zone along the slopes of the dredge cuts in Maplewood Basin, provide habitat for a number of brown and red algal species, particularly along the southern and western shorelines of the dredge basin (Balanced 2017). Two small, sparsely vegetated, patches of eelgrass (3 and 5 m<sup>2</sup> in size) were also identified at the northern end of the Main Basin. Comparatively however, there are larger areas and higher densities of kelp and eelgrass (approximately 250 m<sup>2</sup>) present along a shallow channel (the "Southeast Channel", see **Figure 2-1**) located between the southeastern end of the Main Basin and Burrard Inlet where currents and tidal flow are comparatively high. Enhancement works are not currently proposed for the Southeast Channel given the existing habitat value.



**Photo 3-1** Typical Bottom Substrates Observed Within the Maplewood Basin (Balanced 2017)

Mobile invertebrates (e.g., Dungeness crab), were observed throughout the shallow subtidal zone in Maplewood Basin, however the abundance of these invertebrates was notably lower in the low current and fine sediments areas of the basin when compared to habitats in the Southeast Channel and Burrard Inlet. Benthic sampling in the Main Basin identified butter (*Saxidomus gigantea*), littleneck (*Protothaca staminea*), bent-nosed (*Macoma nasuta*), manila (*Venerupis philppinarum*), and Nuttall's cockle (*Clinocardium nuttallii*) clams.

Based on the observations from October 2017, the overall habitat value, productivity, and biodiversity in Maplewood Basin is notably lower than adjacent habitats found in the Southeast Channel and along the southern slopes of the SIA in Burrard Inlet, where exposure to currents and tidal flushing are comparatively high (Balanced 2017; AECOM 2018a). The results of the survey suggest that the Maplewood Basin provides limited overall habitat values for finfish and macroinvertebrate species. Overall fish habitat productivity appears to be impaired by limited flushing, a general scarcity of hard substrates within the basins, and limited higher value habitats (e.g., eelgrass) within the overall habitat mosaic.

### 3.2 Southern Intertidal Area: Proposed Southwest Channel

The proposed Southwest Channel overlaps a portion of the SIA, located between the Main Basin (to the north) and the main channel of Burrard Inlet (to the south). This area consists of a mixture of cobble, gravel, and sand and shell debris. Generally, substrates in the higher northern portion of the SIA are dominated by cobble substrate (with the exception of a distinct sand/shell ridge) (**Photo 3-2**), which transitions to a mixture of cobble and sand/shell in the mid-intertidal zone, and gravel in the low intertidal zone (**Photo 3-3**).

A low tide assessment in June 2018 identified sea lettuce (*Ulva* sp.) to be the most frequently encountered algae in the SIA overlapping the proposed Southwest Channel (**Appendix A**). Sea lettuce was frequently encountered in the low intertidal zone, with sparser coverage in the lower mid-intertidal zone. In the low intertidal zone, the presence and density of marine vegetation (including sea lettuce, winged kelp (*Alaria esculenta*), sugar wrack (*Saccharina latissimi*), split kelp (*Saccharina groenlandica*), sea felt (*Pylaiella littoralis*), and non-native Japanese wireweed (*Sargassum muticum*)) was significantly higher than the higher elevation intertidal portions of the SIA (**Appendix A**).

Dense accumulations of habitat forming sessile invertebrates (i.e., acorn barnacles (*Balanus glandula*) and bay mussels (*Mytilus trossulus*), **Photos 3-2** and **3-3**), were observed across the SIA overlapping the Southwest Channel, with an abundance of shore crabs throughout the intertidal zone. Sea stars and Pacific oysters (*Crassostrea gigas*) were also observed. Benthic sampling yielded butter, littleneck, bent-nosed, manila, Nuttall's cockle, and gaper (*Tresus* sp.) clams (AECOM 2018c; **Appendix A**).



Photo 3-2 Typical Conditions in the High- to Mid-Intertidal Area Overlapping the Proposed Southwest Channel (Photo from Hemmera: June 14, 2018)



Photo 3-3 Typical Conditions in the Mid- to Low-Intertidal Area Overlapping the Proposed Southwest Channel (Photo from Hemmera: June 14, 2018)

Dungeness crab, northern kelp crab (*Pugettia producta*) and red rock crab (*Cancer productus*) are also present, but with low abundance. Fish species in subtidal areas on the southern edge of the SIA include English sole (*Parophrys vetulus*), kelp greenling (*Hexagrammos decagrammus*), and spiny lump sucker (*Eumicrotremus orbis*) (AECOM 2018c; Balanced 2017).

Based on available field survey data (Balanced 2017; **Appendix A**), the SIA overlapping the proposed Southwest Channel can be categorized as moderately to highly productive intertidal flat habitat that provides biogenic habitats expected to benefit a variety of CRA fish species. For example, the existing habitat would benefit species such as juvenile Dungeness crab, bivalve shellfish, and juvenile salmonids (e.g., in the low intertidal and shallow subtidal benthic algal habitats).

## 4.0 AQUATIC SPECIES AT RISK

When determining potential for Serious Harm, a project must be evaluated to determine if it is likely to adversely impact listed aquatic species at risk and contravene Sections 32, 33 or 58 of SARA.<sup>3</sup> A detailed assessment of listed aquatic species (and wildlife including birds), was conducted in the Existing Ecological Conditions Report for Stage 1 of MMRP (Hemmera 2018b). A summary of the aquatic assessment is provided below.

There were no SARA-listed fish species assessed as having a moderate or high potential of occurring at, or near, MMRP, nor does the Project overlap with critical habitat for aquatic species at risk. Hence the likelihood for these species being negatively affected by construction was determined to be low. However, the post-enhancement effects on most of these species was assessed as providing marginal benefit in the form of increased prey availability. With regard to marine mammals, there is potential for some SARA-listed species (e.g., Steller sea lion (*Eumetopias jubatus*)) to be present in habitat near the MMRP site, which could result in some temporal disturbance to their habitat during construction. However, productivity for some of these species is anticipated to increase due to post-enhancement effects (e.g., increased prey availability, such as chum salmon) resulting from implementation of the Project.

As outlined by Hemmera (2018b), no listed invertebrate species were observed during surveys in the Maplewood Basin or surrounding intertidal banks. Northern abalone (*Haliotis kamtschatkana*), a species listed under Schedule 1 of SARA, has a range that overlaps Burrard Inlet. However, this species is not likely to occur at the existing MMRP site as it is typically found in more exposed areas with good water exchange (e.g., tidal currents). However, development of MMRP will result in large quantities of rock reef habitat which is anticipated to increase drift algae (e.g., kelp), a prime food source for this species. With regard to these enhancements, it is anticipated that MMRP may have a net benefit on this at-risk species.

Given the results of the aquatic species at risk assessment, MMRP is not likely to adversely impact listed aquatic species at risk, or contravene Sections 32, 33, or 58 of SARA.

<sup>3</sup> Sections 32 and 33 of SARA outline general prohibitions for the protection of listed species including prohibitions against killing, harming, possession, and collection of listed species, and damage or destruction of the residence of a listed species. Section 53 of SARA outlines prohibitions for the destruction of critical habitat of a listed species.

## 5.0 SERIOUS HARM ASSESSMENT

### 5.1 Regulatory Context

The FA governs fisheries in Canada. Fish habitat, as defined by the FA under Section 2, consists of:

*“Spawning grounds and any other areas, including nursery, rearing, food supply and migration areas, on which fish depend directly or indirectly in order to carry out their life processes”*

Section 35 of the FA addresses the protection of fish and fish habitat. Section 35(1) states that:

*“No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a Commercial, Recreational or Aboriginal fishery, or to fish that support such a fishery”.*

DFO's FPP Statement (DFO 2013a) provides a definition of Serious Harm, and considerations for understanding when Serious Harm is likely to occur, which includes:

- Death of fish;
- Permanent alteration to fish habitat of a spatial scale, duration or intensity that limits or diminishes the ability of fish to use such habitats as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes; and/or
- Destruction of fish habitat of a spatial scale, duration, or intensity that fish can no longer rely upon such habitats for use as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes.

Project proponents must avoid Serious Harm (e.g., via relocation of a project, or changing the timing of construction), and then mitigate Serious Harm, before DFO will consider authorizing works, undertakings or activities that will require offsetting. DFO's FPP Statement (DFO 2013a) recognizes that not all levels of fish mortality or permanent alteration to, or destruction of, fish habitat constitute Serious Harm, or require Authorization and offsetting. Projects requiring Authorization (i.e., to authorize residual Serious Harm) are those likely to result in a localized effect on fish populations or fish habitat in the vicinity of the project that adversely affect the sustainability and ongoing productivity of CRA fisheries. Activities with the potential to result in a localized effect on fish populations are considered to be those associated with increased fish mortality rates, increased stress or reduced fitness as a result of direct injury, or reduced habitat function such that a localized effect on a fish population or stock is possible. If residual Serious Harm to fish that are part of a CRA fishery, or to fish that support such a fishery, is unavoidable, then habitat creation, restoration, or enhancement may be required to offset project effects, pursuant to an Authorization under Section 35 (2) of the FA.

### 5.2 DFO Review Guidance

There is no mandatory requirement for proponents to submit a project for review under the FA. However, VFPA has agreed to provide reviewable information to DFO for its enhancement projects proposed for deposit into VFPA's Habitat Bank. Proponents working near water must comply with the prohibition against causing Serious Harm. DFO's "Projects Near Water" website guides proponents to either self-assess a



project, submit a Request for Review to DFO, or to apply for an Authorization (DFO 2018). Projects listed as not requiring a review by DFO include "Habitat Restoration" projects, described as: *Restoration projects undertaken with the sole purpose of improving or repairing existing habitats including riparian planting, shoreline/bank stabilization, bio-engineering and creation of in-stream structure*", where:

- no new temporary or permanent fill is placed below the high-water mark;
- obstructions to fish passage respect timing windows;
- in-water work is timed to respect timing windows;
- relevant measures to avoid harm are followed;
- criteria for all associated project activities are respected; and,
- no removal of riparian vegetation if the riparian area is identified as part of the critical habitat of an aquatic listed species at risk.

While construction of MMRP does not meet all of the conditions listed above for non-reviewable habitat restoration projects (i.e., placement of fill below the high-water mark), the placement of fill material is for the purpose of improving existing habitat value (i.e., restoring habitat, for example to create the base for rock reefs during Stage 1(b)).

As described in **Section 3.1**, the existing fish habitat value in the Northeast Basin overlapping Stage 1(b) of MMRP, and the Main Basin overlapping Stage 2 of MMRP, is relatively low as it is characterized by limited tidal flushing, a general scarcity of hard substrates, limited higher value habitats (e.g., eelgrass) and degradation due to anthropogenic activities (e.g., past dredging and log sorting and storage). Enhancement of these relatively low value habitats to higher value habitats (e.g., rocky reefs, and potential eelgrass and intertidal flats) is not anticipated to result in Serious Harm.

Serious Harm assessments have been undertaken for other VFPA HEP projects with support from DFO, such as with the Glenrose Tidal Marsh (Glenrose) Project. The Glenrose project involved conversion of low value sandflat and some higher value mudflat into overall higher productivity marsh habitat. Adapted relative values of habitats within the Fraser River estuary (modified from Williams and Colquhoun 1989, Hamilton 1984, B. Naito, pers. comm., 2013) were used to account for the conversion of approximately 0.9 ha of functional mudflat habitat to higher functioning marsh habitat. QEPs on behalf of VFPA, conducted an Assisted Assessment of Serious Harm for the Glenrose project which concluded that: "*it is the opinion of the project team that the works, as proposed will not result in Serious Harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery and that a Section 35(2)(b) Authorization is not required for the project*". DFO's Fisheries Protection Program subsequently confirmed this assessment of no Serious Harm and concluded that an Authorization would not be required provided that standard mitigation measures, as outlined in a DFO-issued letter (DFO 2014b), were implemented during project construction. The Glenrose project was successfully constructed in 2014 and subsequently deposited into VFPA's Habitat Bank. There are some similarities between the Glenrose project and Stage 1(b) of MMRP in the context of the conversion of areas of one functioning fish habitat type into another type of high value fish habitat.

The following assessment of Serious Harm evaluates temporal and long-term effects (positive and negative) in the context of the larger MMRP and Burrard Inlet habitats when determining potential for Serious Harm.

### 5.3 Pathways of Effects

Without appropriate mitigation measures in place, in-water activities for MMRP have the potential to negatively affect fisheries resources. DFO has defined pathways of effects for typical pre-mitigation construction activities, which are used to describe development proposals in terms of the activities that are involved; the type of cause-effect relationships that are known to exist; and the mechanisms by which stressors ultimately lead to effects in the aquatic environment (DFO 2014c). **Table 5-1** identifies pre-mitigation in-water activities associated with MMRP which have potential to affect aquatic resources, as defined by DFO. The anticipated effects associated with these pathways of effects, and their potential to result from MMRP prior to mitigation, are described in **Table 5-2**. An assessment of these potential effects (with reference to proposed mitigation measures to address these potential effects) is also provided in **Table 5-2**, with mitigation measures outlined in more detail in **Section 5.4** of this assessment.

**Table 5-1 In-Water Construction Activities Associated with Stage 1(b) and Stage 2 of MMRP**

Construction Activity	Description of the Activity
<b>Use of industrial equipment</b>	<b>Any activity where machinery is working on land or in water:</b> Use of industrial equipment (e.g., marine derricks, cranes, a clam-shell dredge, etc.), will be temporarily required to facilitate construction of MMRP.
<b>Dredging</b>	<b>The physical removal of materials from the bed of a waterbody for the purpose of excavating, clearing, deepening, widening, or lengthening the waterbody:</b> Construction of the Southwest Channel will result in excavation of approximately 85,000 m <sup>3</sup> to 90,000 m <sup>3</sup> of primarily sand and gravel material in areas overlapping the SIA. The area will be dredged to a depth of approximately -4.0 m CD (from its existing elevation ranging between approximately 0.0 m and 2.0 m CD) (AECOM 2018b).
<b>Placement of material or structures in water</b>	<b>The placement of structures that either fully or partially obstruct flow on the bed or banks of a waterbody:</b> Placement of rock for the construction of rock reef habitat, and fill for construction of other habitat types, will alter flow in the waterbody. As well, there may be temporal installation of structures (e.g., silt curtains) that may partially obstruct flow during construction.
<b>Fish passage issues</b>	<b>Activities that cause physical or physiological impediments to fish movement or migration:</b> Temporal impacts to fish passage will result during construction of MMRP (e.g., during excavation of the Southwest Channel, and placement of fill materials and habitat enhancement features in Maplewood Basin).
<b>Change in timing, duration, and frequency of flow</b>	<b>Activities that result in changes in the timing, duration, and/or frequency of water flow:</b> Construction of the Southwest Channel will increase tidal flushing in the Maplewood Basin (i.e., tidal flushing is anticipated to improve by approximately 60% (AECOM 2018c)). In addition, placement of fill material for construction of habitats in the Northeast Basin (i.e., for Stage 1(b)) and Main Basin (i.e., for Stage 2) is anticipated to reduce the residence time of water in Maplewood Basin due to changes in the bathymetry (i.e., the marked increase in elevation of the seafloor resulting in a reduction in water column volume) (VFPA 2018).
<b>Addition or removal of aquatic vegetation</b>	<b>The addition or removal of aquatic vegetation:</b> Removal of existing aquatic vegetation (primarily green and brown algal species in the lower intertidal zone) will occur during excavation of the Southwest Channel ( <b>Appendix A</b> ). In addition, some sparse vegetation in the Maplewood Basin may be removed (filled over) during enhancement work (Balanced 2017). However, construction of rock reef habitat for Stage 1(b) will provide attachment sites for kelp and other aquatic vegetation. Enhancement initiatives for Stage 2 are also anticipated to increase aquatic vegetation (e.g., via the creation of rock reef and/or eelgrass habitats). Overall there is expected to be a net increase in aquatic vegetation (and resulting primary productivity) associated with the MMRP site.



Table 5-2 Description and Pre-Mitigation Likelihood of Effects on Fisheries Resources from Stage 1(b) and Stage 2 of MMRP and Assessment of Effects

Potential Residual Effect	Adapted DFO Description	Pathways of Effects: In-Water Activities						Pre-mitigation Likelihood of Effects	Assessment of Effects
		Use of Industrial Equipment	Dredging	Placement of Material or Structures in Water	Fish Passage Issues	Change in Timing, Duration, and Frequency of Flow	Addition or Removal of Vegetation		
Change in habitat structure and cover	The addition of instream organic structure and soils can affect the capacity of a watercourse to maintain a dispersed and diverse community of aquatic organisms by restricting habitat connectivity and the opportunities for organisms to use, colonize, and move between existing aquatic environments. The removal of instream vegetation can reduce channel stability, cover and protection from predators and physical disturbances, and the availability of diverse and stable habitats.		X	X		X	X	<b>Certain.</b> The intent of MMRP is to restore and enhance fish habitat, which will change habitat structure and cover at the MMRP site (e.g., conversion of relatively unproductive subtidal habitat in the Northeast Basin to more productive rocky reef habitat). During construction, dredging of productive intertidal habitat overlapping the Southwest Channel to create primarily subtidal rock reef habitat could adversely affect the aquatic species present in the footprint of the Project, thus resulting in a temporal loss in productivity.	<b>Positive.</b> MMRP is expected to increase the density and diversity of the aquatic community at the Project site. When considering the overall long-term fish habitat benefits from implementation of Stage 1(b) and Stage 2 of MMRP (e.g., an increase in primary productivity and tidal flushing), the fish habitat benefits from construction of MMRP are expected to provide substantial enhancements over existing habitat conditions (see <b>Section 2.2</b> ).
Change in access to habitat/migration	An alteration in water depth, flow, and/or substrate size causing a disruption in access to fish habitats essential for various life processes within given fish populations, such as spawning and rearing.	X	X	X	X	X	X	<b>Certain.</b> Construction of a new channel (the Southwest Channel), and local changes in bathymetry (e.g., a shallower Maplewood Basin) will change fish access to existing habitats. Construction of Stage 1 of the Project will increase tidal flushing by approximately 60% (AECOM 2018c), and involve changes to substrate types (e.g., conversion of fine sediments to rocky reef habitat). In addition, there will be a temporal disruption in fish access to these habitats during construction (e.g., potential interference from machinery).	<b>Positive.</b> The long-term results are anticipated to increase habitat access and availability for fish to carry out various life processes, such as spawning and rearing (see <b>Section 2.2</b> ).
Change in food supply	The aquatic food supply must be plentiful and diverse to sustain the productivity of a watershed. An increase or decrease in the quantity or composition of the food supply, beginning with plants and organic debris that fall into a waterway, can alter the structure of the aquatic community.		X	X		X	X	<b>Certain.</b> The intent of MMRP is to enhance fish habitat (e.g., via the creation of rocky reef habitat supporting marine vegetation).	<b>Positive.</b> Creation of rock reef habitat (and other enhanced fish habitats such as eelgrass) is intended to increase primary productivity, and detrital contribution to nearby habitats and food webs, thereby positively altering the structure of the aquatic community (see <b>Section 2.2</b> ).
Change in sediment concentrations	Increased sediments, which contain nutritive elements and can capture or absorb contaminants, are suspended or else settle and collect in waterways affecting physical processes, structural attributes, and ecological conditions such as water clarity (by reducing visibility and sunlight, and damaging fish gills) and reducing the availability and quality of spawning/rearing habitat (through infilling).		X	X				<b>Certain.</b> Dredging of the Southwest Channel is proposed as part of Stage 1(b) of MMRP. Dredging is anticipated to be undertaken using a marine derrick equipped with a clam-shell dredge or equivalent. This will result in brief, localized increases in suspended sediment in the water column. In addition, placement of material in the Northeast Basin will be required to raise the grade of the substrate to a suitable elevation for the establishment of the different proposed habitat types (e.g., eelgrass beds). It is anticipated that similar temporal effects from sediment placement will occur during Stage 2 of MMRP.	<b>Mitigation Required, Long-term Neutral Effects Anticipated.</b> While there may be some elevated levels of suspended sediments during establishment of habitat in Maplewood Basin and Southwest Channel, these effects are anticipated to be temporal only, with suspended sediment concentrations returning to pre-construction conditions shortly following disturbance. Mitigation measures to address this potential negative residual effect are provided in <b>Section 5.4</b> .

Potential Residual Effect	Adapted DFO Description	Pathways of Effects: In-Water Activities						Pre-mitigation Likelihood of Effects	Assessment of Effects
		Use of Industrial Equipment	Dredging	Placement of Material or Structures in Water	Fish Passage Issues	Change in Timing, Duration, and Frequency of Flow	Addition or Removal of Aquatic Vegetation		
Potential mortality of fish/ eggs/ ova	Direct injury or mortality of fish (eggs, larvae, invertebrates, etc.) from physical disruption from equipment.	X	X	X				Likely. Direct mortality of benthic and non-motile CRA fisheries species is likely to occur during dredging and material placement activities.	Mitigation Required, Long-term Positive Effects Anticipated. A net positive effect is anticipated for fish populations following Project construction. However, without mitigation (e.g., salvages), temporal construction-related impacts have the potential to negatively affect fish and invertebrates within the Project footprint. Mitigation measures to address this potential negative residual effect are provided in Section 5.4.
Change in dissolved oxygen	Adequate concentrations of oxygen dissolved in water are necessary for the life of fish and other aquatic organisms. Dissolved oxygen is affected by a number of different factors, including temperature, biological activity, and turbulence.					X	X	Possible. Construction of the Southwest Channel, and shallower habitats in the Maplewood Basin, are anticipated to increase tidal flushing which may have some localized increases in dissolved oxygen levels. In addition, an increase in primary productivity is anticipated to result in increased oxygen production at the MMRP site.	Positive. An increase in dissolved oxygen levels is anticipated to have a net benefit on the aquatic community (see Section 2.2).
Change in nutrient concentrations	Some activities may cause an increase in nitrifying elements such as nitrogen and phosphorus and mineral compounds such as ammonia, nitrates, nitrites, and orthophosphates. This can lead to eutrophication which consumes oxygen, depleting it from bottom waters. The resulting low dissolved oxygen concentrations drive fish from their preferred habitat and can cause other organisms to die.		X	X		X	X	Possible. Alteration of existing habitat conditions can change the local chemistry (e.g., exposure of buried substrates to the water column).	Positive. Construction of the Project, and increases in primary and detrital production from macroalgae, are anticipated to have beneficial localized effects on nutrient cycling (see Section 2.2).
Change in contaminant concentrations	An increase in concentrations of toxins and pollutants in sediments and waters can breach the range of chemical parameters that support healthy aquatic communities, seriously affecting fish and fish habitat. The ecological effects can range from direct fatality to organisms, alteration of the ecosystem structure through changes in the abundance, composition and diversity of communities and habitats, and persistence and progressive accumulation in sediments or biological tissues (bioaccumulation, bio-magnification). Deformities, alterations in growth, reproductive success, and competitive abilities can result.	X	X	X		X		Possible. The Project will involve the use of industrial equipment within the marine environment. Use of machinery increases the potential for leaks and spills of pollutants to occur. Placement of fill material (e.g., from the Southwest Channel and/or maintenance dredging in the Fraser River), has the potential to contain toxins and pollutants which could mobilize contaminants in the water column. Increased tidal flushing would change the residence time of water, possibly altering the residence time of pollutants or contaminants found in the Maplewood Basin.	Mitigation Required, Long-term Positive Effects Anticipated. Without implementation of appropriate environmental management during construction, there is increased risk of negative effects occurring due to potential spills. Mitigation measures to address this potential negative residual effect are provided in Section 5.4. Sampling and chemical characterization of the SIA overlapping the proposed Southwest Channel, potential source sites for Stage 1(b) of MMRP (i.e., Southwest Channel material and Fraser River sands), and the receiving site for Stage 1(b) of MMRP (i.e., the Northeast Basin) was completed by Hemmera (2018a). The analyses indicated that sediments from the potential source sites meet necessary sediment quality criteria and are of better quality than the receiving site. Thus, placement of material in the Northeast Basin is not likely to degrade the receiving environment and may in fact have a positive effect with respect to contaminant exposure. With respect to increased tidal flushing resulting from construction of MMRP, a reduced residence time of water in Maplewood Basin may decrease the potential for accumulation of pollutants in the Maplewood Basin, which is anticipated to have a positive localized effect.

## 5.4 Mitigation Measures

As described in the assessment of effects column in **Table 5-2** above, MMRP is anticipated to result in net positive benefits to aquatic species and fish habitat. However, there is potential for negative impacts to occur both during, and following, construction. Three potential negative residual effects associated with temporal construction activities (i.e., potential changes in sediment and contaminant concentrations, and direct mortality to fish) were identified in **Table 5-2**. A Construction Environmental Management Plan (CEMP) for Stage 1 of MMRP was developed by Hemmera (**Appendix B**) which provides measures to address these short-term temporal effects. Many of the mitigation measures and best management practices outlined in the CEMP are also expected to be implemented for Stage 2 of the Project. Once Stage 1 of the Project is tendered, the selected Contractor will be responsible for developing an additional Project-specific Environmental Protection Plan to avoid potential adverse environmental impacts based on specific equipment and refined construction methodologies.

The following outlines some of the specific mitigation measures developed to address potential negative impacts to aquatic species during construction of Stage 1 of MMRP. Dependent on the specific construction methodology proposed, additional mitigation measures will be incorporated into the Contractor's Environmental Protection Plan, as appropriate. More detailed mitigation is available in the attached CEMP (**Appendix B**).

### Mitigation for Potential Contamination:

- Best management practices for machinery and equipment will be implemented to reduce the potential for spills of pollutants and toxins into the marine environment. This includes implementation of a spill response plan. More details related to machinery and equipment mitigation for Stage 1 of MMRP are provided in the attached CEMP (**Appendix B**).

### Mitigation for Potential Mortality to CRA Fish Species:

- To mitigate impacts to aquatic life during implementation of Stage 1, heavy construction work (dredging activities and placement of materials) will take place during the applicable annual least-risk fisheries timing window (i.e., August 16<sup>th</sup> to February 28<sup>th</sup>), where possible. However, due to the potential material settlement time required for sediment placement in the Northeast Basin, material placement may extend beyond the end of the least-risk timing window (e.g., post-February 28<sup>th</sup>). Any work outside the window would occur with appropriate mitigation in place.
- Marine life salvages will be undertaken within the Southwest Channel and the Northeast Basin prior to construction activities. Target salvage species will be CRA invertebrates including, but not limited to, Dungeness crabs, red rock crabs, California sea cucumbers (*Apostichopus californicus*), sea urchins, and bivalve shellfish (e.g., Pacific oysters). Finfish will not be targeted by the salvage as they are expected to move out of the work area as construction activities begin.
  - In advance of dredging of the Southwest Channel, a salvage of marine organisms (focused on bivalve shellfish) will be undertaken during a low tide. Salvaged marine organisms will be relocated to nearby appropriate habitats not affected by construction.
  - In the Northeast Basin, pre-construction dive surveys and associated marine life salvages are proposed in advance of fill or rock material placement, primarily to recover less mobile marine life (e.g., California sea cucumbers and urchins). Following dive surveys and diver-supported marine life salvages, trapping will be used as a primary means of salvaging crabs. Salvaged organisms will be relocated to similar habitat outside the Northeast Basin.

- Slow commencement of in-water construction activities will be implemented by the contractor to encourage mobile aquatic species to leave the construction area.
- Marine mammal safety zones will be established around the Project site, including a 1,000 m safety zone for cetaceans (whales, dolphins, and porpoises) and a 150 m safety zone for pinnipeds (seals and sea lions).

**Mitigation for Increased Sedimentation:**

- To mitigate impacts from sediment suspension, appropriate dredging equipment will be selected and operated in a manner that reduces spillage, with placement of rock and fill material to occur in a controlled manner.
- While it is anticipated that dredged and placed materials will settle out of suspension relatively quickly due to the high settling velocity of sand and the relatively low velocity waters at the receiving sites in the Maplewood Basin, it is anticipated that silt curtains will be used where technically feasible to limit the release of turbid waters during dredging of the Southwest Channel and placement of fill in the Northeast Basin.

**5.5 Residual Effects Assessment**

The FA requires that proposed projects avoid Serious Harm to fish that contribute to CRA fisheries, unless authorized. Project proponents must first consider avoidance measures (e.g., relocation, timing) and then implement mitigation measures to avoid or reduce Serious Harm. Proponents are asked to consider key project-related effects when making determinations about whether a project is likely to cause Serious Harm. Key factors in the consideration of such an assessment includes likelihood of an effect, the duration of the effect, the geographic extent of the impacts, the availability of similar, nearby habitats, dependency of fish on the affected habitats; the magnitude of the effect, whether there is a localized effect (e.g., reduced productivity of populations); and the anticipated residual Serious Harm (e.g., if there is Serious Harm after mitigation is implemented).

The key Project-related effects are listed below, followed by a discussion of the relevant effects as they relate to MMRP:

1. **Impacts to fish and fish habitat caused by the Project:** Existing fish habitat values in the Main Basin and the Northeast Basin are currently impaired by limited flushing, a general scarcity of hard substrates, limited higher value habitats and habitat degradation from past anthropogenic uses (e.g., wood waste accumulation). During Stage 1(b) and Stage 2 of MMRP, existing low value subtidal areas within the Maplewood Basin will be converted to more productive fish habitat (e.g., subtidal rock reef habitat).

Construction of the Southwest Channel will alter the pre-construction condition which is characterized by macroalgae habitat and bivalve shellfish beds in the marine intertidal zone to primarily subtidal current-swept reef. This alteration is also expected to result in a localized change in fish use in the SIA in the vicinity of the Southwest Channel. Construction of the Southwest Channel will result in a substantial improvement in tidal flushing and water exchange throughout the Maplewood Basin, which is anticipated to confer substantial fish habitat benefits in the form of enhanced nutrient transport; improved water quality; reduced siltation of marine vegetation; and, increased suspension and distribution of eggs and larvae of pelagic spawning fish and invertebrates, as well as marine vegetation spores (AECOM 2018c). Thus, in the context of the larger Project (i.e., the Northeast Basin and Main Basin enhancements), construction of the Southwest Channel is anticipated to have a net benefit on fish and fish habitat.

Dredging of the Southwest Channel, infilling in the Northeast Basin, and habitat enhancement in the Main Basin have the potential to result in mortality of some sessile species. Fish and invertebrate mortality (in particular finfish and crabs) can be mitigated during construction through application of appropriate best management practices, as described in **Section 5.4** and the Stage 1 CEMP (**Appendix B**). Potential effects to sessile invertebrates (e.g., bivalve shellfish) will be mitigated via targeted invertebrate salvages prior to construction within the Southwest Channel footprint of the SIA.

2. **The duration of the impacts:** Excavation of intertidal habitat in the SIA will result in a temporal loss of productivity. However, enhanced productivity associated with the created habitats will begin contributing to fish habitat values in a substantive way immediately upon construction, especially with respect to increased tidal flushing resulting from the creation of the Southwest Channel. Other areas, including rock reef habitats within the Northeast Basin, are expected to notably improve upon existing fish habitat values within one year after construction. As a result, the Project as a whole is expected to provide direct benefits to the next period of out-migrating juvenile salmonids, spawning adult Pacific herring, and all life history stages of Dungeness and red rock crabs. It is anticipated that constructed habitats at the site will become well established within one to three years, and full functionality and productivity can be expected within five years. This will be confirmed by a post-construction (effectiveness) monitoring program. The post-construction monitoring program will be subject to the relevant terms and conditions associated with the FA Authorization for CEP, the Habitat Bank Working Agreement between VFPA and DFO, as well as any applicable conditions of other permits and approvals.
3. **The geographic scale of the impacts:** Burrard Inlet, including the Maplewood Basin and Flats, sustains intertidal marsh, intertidal sand- and mudflat, intertidal and subtidal eelgrass, and subtidal habitat areas that are utilized by numerous fisheries species. The geographic scale of any construction-related effects of the Project will be short lived, and small-scale within the context of the marine habitats present within Burrard Inlet, including the intertidal flats and subtidal areas at and near the Project site (i.e., Maplewood Flats and Basin).
4. **The availability and condition of nearby fish habitat:** Although Burrard Inlet has been subject to extensive shoreline modifications over the past century, there remains an extensive fish habitat mosaic within the inlet. Most notably, this includes the adjacent intertidal flats and subtidal areas near the MMRP site (i.e., Maplewood Flats). Existing habitat conditions in the Northeast Basin and Main Basin (e.g., deep subtidal soft bottom habitats subject to negative anthropogenic effects) are common in Burrard Inlet, and enhancement of these types of habitats will increase overall inlet productivity.

The existing intertidal flats surrounding the Maplewood Basin extend over approximately 90 ha. Habitats present in the SIA in the footprint of the Southeast Channel are productive as indicated by the presence of barnacles and bivalve shellfish. However, the Project will result in the conversion of less than 3% of this existing intertidal flat habitat surrounding the Maplewood Basin. Alteration to create the Southwest Channel will increase tidal flushing and water exchange, and result in productivity gains that will be compounded by habitat enhancement in the Northeast Basin and Main Basin without impacting fish access or use of nearby habitats.

5. **Impact on the relevant fish:** Localized effects on fish populations or stocks (e.g., juvenile Pacific salmon, Pacific herring, or crabs) are not anticipated for proposed enhancement works in the Northeast Basin (~0.4 ha enhancement) and the Main Basin (~11.6 ha). Intertidal bivalve shellfish habitat, will be negatively affected by construction of the Southwest Channel (~2.4 ha) and there will be a change of habitat and species use for this portion of the Project. At present, species use includes all life stages for a variety of bivalve shellfish and important habitats for rearing juvenile salmonids and rearing commercial crab species. Habitats will change to subtidal reef/channel that will support critical functions for adult crab, juvenile rockfish and lingcod, and other reef-reliant species. In the context of the Project (i.e., the Southwest Channel (~2.4 ha), Northeast Basin (~0.4 ha), and Main Basin (~11.6 ha) areas), it is anticipated that enhanced habitats will result in a net gain of productivity for a variety of species including Pacific salmon, Dungeness crab, reef-dependent species and other CRA fishes.
6. **Proposed avoidance and mitigation measures:** Avoidance of potential impacts on fisheries species will be provided through the application of mitigation measures outlined in **Section 5.4** including least-risk work windows, and CRA invertebrate salvages prior to construction. The Project will be monitored through both construction and post-construction monitoring to ensure its success as a habitat enhancement project under the VFPA HEP.

## 6.0 SERIOUS HARM ASSESSMENT SUMMARY

This Assisted Assessment indicates that the overall fish habitat benefits from implementation of Stage 1(b) and Stage 2 of MMRP (i.e., an increase in primary productivity and tidal flushing over approximately 12 ha; enhancement of approximately 11.6 ha in the Main Basin; and enhancement of approximately 0.4 ha in the Northeast Basin), are expected to provide substantial net productivity gains for fish over existing habitat conditions (i.e., the relatively low value habitat in Maplewood Basin). There will be some short-term disturbance associated with construction of the NE Basin, Main Basin and Southwest Channel; however, residual habitat benefits are expected to apply over the long-term.

DFO's FPP Statement (DFO 2013a) recognizes that not all levels of fish mortality or permanent alteration to, or destruction of, fish habitat constitute Serious Harm, or require Authorization and offsetting. Projects requiring Authorization (i.e., to authorize residual Serious Harm) are those likely to result in a localized effect on fish populations or fish habitat in the vicinity of the project that adversely affect the sustainability and ongoing productivity of CRA fisheries. Excavation of the Southwest Channel will alter fish habitat and result in a shift of fish species use in the localized area of the channel. This will include conversion of approximately 2.4 ha of productive intertidal habitat to comparably productive subtidal habitat, and a shift in species use from primarily bivalve shellfish, juvenile salmonid and juvenile crab, towards primarily reef fishes (e.g., rockfish and lingcod), adult crab and other motile invertebrates (e.g., urchins and sea cucumbers); however, the new habitat types in the Southwest Channel are still anticipated to be utilized by juvenile salmonids and juvenile crabs.



## 7.0 CLOSURE

This Work was performed in accordance with the Contract for Environmental Advisory Services for Phase 2 of the Habitat Enhancement Program between Hemmera Envirochem Inc. (Hemmera), a wholly owned subsidiary of Ausenco Engineering Canada Inc. (Ausenco), and Vancouver Fraser Port Authority (Client), dated July 1, 2015 (Contract). This Report has been prepared by Hemmera, based on fieldwork conducted by Hemmera, for sole benefit and use by Vancouver Fraser Port Authority. In performing this Work, Hemmera has relied in good faith on information provided by others, and has assumed that the information provided by those individuals is both complete and accurate. This Work was performed to current industry standard practice for similar environmental work, within the relevant jurisdiction and same locale. The findings presented herein should be considered within the context of the scope of work and project terms of reference; further, the findings are time sensitive and are considered valid only at the time the Report was produced. The conclusions and recommendations contained in this Report are based upon the applicable guidelines, regulations, and legislation existing at the time the Report was produced; any changes in the regulatory regime may alter the conclusions and/or recommendations.

We sincerely appreciate the opportunity to have assisted you with this project and if there are any questions, please do not hesitate to contact the undersigned by phone at 604.669.0424.

Report prepared by:  
**Hemmera Envirochem Inc.**



Anne Rutherford, M.Env.Sc., R.P.Bio.  
Fisheries Biologist

Report prepared by:  
**Hemmera Envirochem Inc.**



Scott Northrup, B.Sc., R.P.Bio.  
Senior Fisheries Biologist

Report prepared by:  
**Hemmera Envirochem Inc.**



Jim Roberts, B.Sc., R.P.Bio.  
Senior Fisheries Biologist

Report reviewed by:  
**Hemmera Envirochem Inc.**



David Gibson, B.Sc., M.Sc.  
Project Manager

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# **APPENDIX A**

## **Southwest Channel Biophysical Sampling Report**



**Hemmera Envirochem Inc.**  
18th Floor, 4730 Kingsway  
Burnaby, BC V5H 0C6  
T: 604.669.0424  
F: 604.669.0430  
hemmera.com

September 26, 2018  
File No. 989565-05

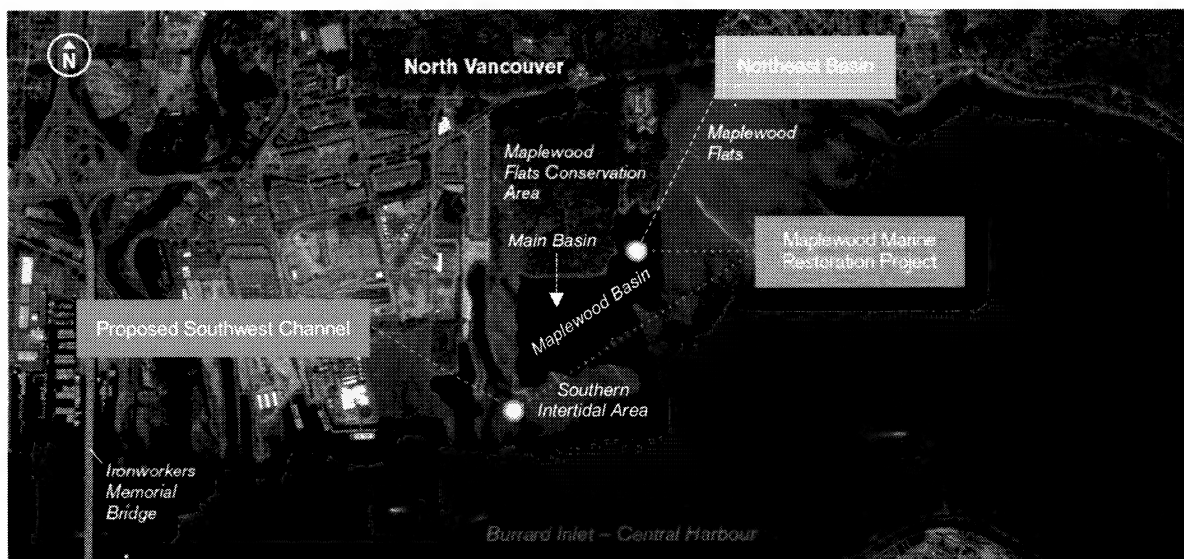
Vancouver Fraser Port Authority  
100 The Pointe, 999 Canada Place  
Vancouver, B.C. Canada V6C 3T4

**Attention: Charlotte Olson, Manager, Infrastructure Habitat Development**

**Re: Maplewood Marine Restoration Project, Biophysical Sampling Results from the Proposed Southwest Channel**

## 1.0 INTRODUCTION

The Maplewood Marine Restoration Project (MMRP) site is being considered for habitat enhancement by Vancouver Fraser Port Authority's (VFPA) Habitat Enhancement Program (HEP). The MMRP site is located approximately two kilometres east of the Ironworkers Memorial Bridge on the north shore of Burrard Inlet (**Figure 1**). The MMRP includes the proposed Southwest Channel which will be constructed in the Southern Intertidal Area (SIA) commencing at the southwest corner of the Main Basin with an outlet to the deeper subtidal waters of Burrard Inlet.



**Figure 1** Location of the MMRP Site along the north shore of Burrard Inlet

Excavation of the proposed Southwest Channel, along the southwest portion of the SIA, will create approximately 24,000 m<sup>2</sup> (plan area) of primarily subtidal rock reef and tidal channel habitat (AECOM 2018). It will also provide enhanced tidal exchange in the Main and Northeast Basin (AECOM 2018). The purpose of this report is to assess the existing habitat value within the footprint of the proposed Southwest Channel.

This Work was performed in accordance with the Contract for Environmental Advisory Services for Phase 2 of the Habitat Enhancement Program (Contract Number 81303) between Hemmera Envirochem Inc. (Hemmera) and Vancouver Fraser Port Authority, dated July 1, 2015 ("Contract"). This Report has been prepared by Hemmera, based on fieldwork conducted by Hemmera, for sole benefit and use by the Vancouver Fraser Port Authority. In performing this Work, Hemmera has relied in good faith on information provided by others and has assumed that the information provided by those individuals is both complete and accurate. This Work was performed to current industry standard practice for similar environmental work, within the relevant jurisdiction and same locale. The findings presented herein should be considered within the context of the scope of work and project terms of reference; further, the findings are time sensitive and are considered valid only at the time the Report was produced. The conclusions and recommendations contained in this Report are based upon the applicable guidelines, regulations, and legislation existing at the time the Report was produced; any changes in the regulatory regime may alter the conclusions and/or recommendations.

## 2.0 ASSESSMENT METHODS

To assess the existing habitat value of the SIA that will be affected by excavation (i.e., dredging) of the proposed Southwest Channel, supplemental site-specific biophysical information was required. A field program was completed by Hemmera on June 14, 2018. The following report summarizes existing biophysical information relating to the SIA, and the results of recent supplemental biophysical sampling to assist with the determination of existing habitat productivity in the proposed Southwest Channel.

Background information related to biophysical habitat values at the MMRP site was gathered from the Burrard Inlet Environmental Action Program's (BIEAP's) Habitat Atlas (BIEAP 2010),<sup>1</sup> biophysical surveys undertaken by Balanced Environmental Services Inc. (Balanced 2017), and prior field data collected by Hemmera (Hemmera 2013). This information is summarized below and was used to inform this supplemental assessment.

Supplemental biophysical sampling by Hemmera was undertaken on June 14, 2018 during a low tide event (with tides between approximately 0.14 and 1.84 m chart datum, CD (DFO 2018)). Inventory methods were adapted from Fisheries and Ocean Canada's Marine Foreshore Environmental Assessment Procedure (DFO 2006). Field data was collected relating to substrate composition, dominant habitat types (e.g., described by encrusting invertebrate and macroalgae communities), and bivalve shellfish presence and densities.

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<sup>1</sup> Physical and biological features were characterized using a combination of existing data, field verification undertaken from May to August 2009, and 2005 orthophotographs (Lamagna and Walker 2009).

Sampling was undertaken by a team of two registered professional biologists from Hemmera and a field technician from the Tsleil-Waututh Nation. A pre-typed, georeferenced aerial photograph was used to guide establishment of two longitudinal transects within the proposed Southwest Channel: Transect 1 approximately 20 m from the western boundary of the proposed Southwest Channel; and, Transect 2 approximately 20 m from the eastern boundary of the proposed Southwest Channel (**Appendix A: Figure 1**). Transects 1 and 2 were approximately 270 m and 260 m long, respectively. One metre square sampling quadrats were established throughout the length of each transect (**Photo 1**), including the start and end locations of each transect. Transect 1 was sampled starting at the north end of the transect heading south (i.e., seaward) with quadrat sampling occurring approximately every 10 m, and more frequently if a notable change in substrate or habitat type was observed (i.e., 29 quadrats were established). Transect 2 was sampled at approximately 20 m intervals from the south to the north end (i.e., landward) of the proposed Southwest Channel (i.e., 14 quadrats were established). At each one metre quadrat, percent areal substrate composition (i.e., boulder, cobble, gravel, sand, silt/mud, and shell) (Wentworth 1922),<sup>2</sup> percent areal coverage of macrophytes and encrusting/colonial invertebrates (i.e., barnacles and mussels), and abundance of motile invertebrates and fish were recorded. This data was used to develop the polygon-based habitat types for mapping. The following habitat types were used to categorize the proposed Southwest Channel: Barnacles (>30% barnacle coverage); Moderate Barnacles (10 to 30% barnacle coverage); Bare Sand/Shell (<10% coverage by encrusting invertebrates or algae); Benthic Algae (coverage by benthic algae in the low intertidal zone); and, Channel (submerged substrate).

To provide more detailed information on the presence and abundance of intertidal bivalves, bivalve sampling occurred at approximately 45% of the sampling quadrats (e.g., in areas not submerged by water and in a variety of habitat types). Smaller quadrats (25 cm by 25 cm) were excavated to a depth of 25 cm. Excavated sediment was passed through a coarse sieve (with a diameter of 0.25") and bivalve shellfish were retained following the methods outlined by Gillespie and Kronlund (1999) (**Photo 2**). All collected individuals were counted, measured (along the longitudinal axis), returned to the excavated quadrat, and reburied. Clam lengths were used to estimate biomass (excluding any clams less than 0.25" (i.e., 6.35 mm)) using the following equation:  $Weight = \alpha(Length)^{\beta}$ . The parameters  $\alpha$  and  $\beta$  were adapted from Bradbury et al. (2005) who calculated estimated weights of common intertidal clam species in Puget Sound using measured length and weight data from field collections.

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<sup>2</sup> Substrates were classified as a single dominant substrate if it covered 65% or more of the sampling quadrat, while substrates were classified as mixed if there was more than one substrate type with a coverage greater than 30%.



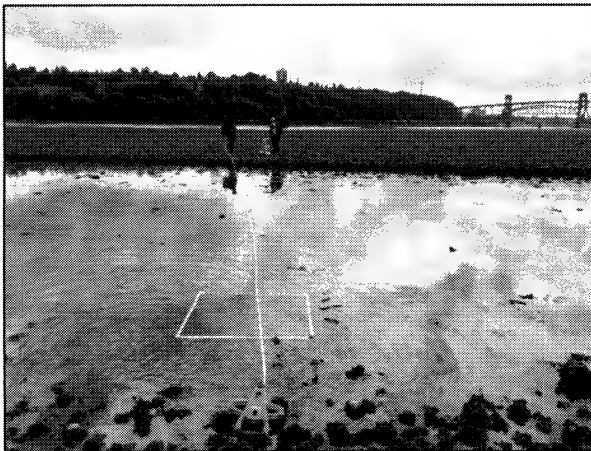


Photo 1 Establishment of a quadrat sampling location along Transect 2 (June 14, 2018).

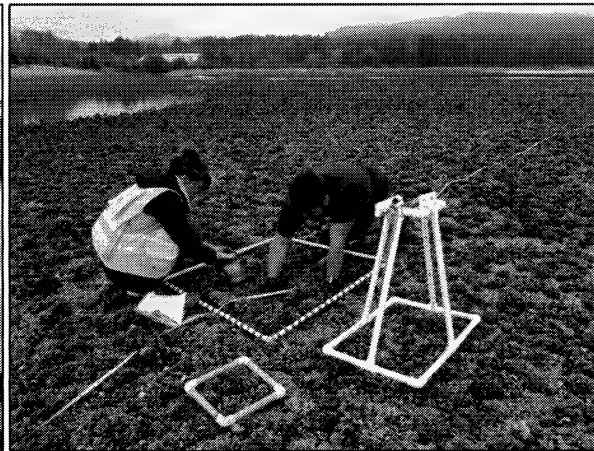
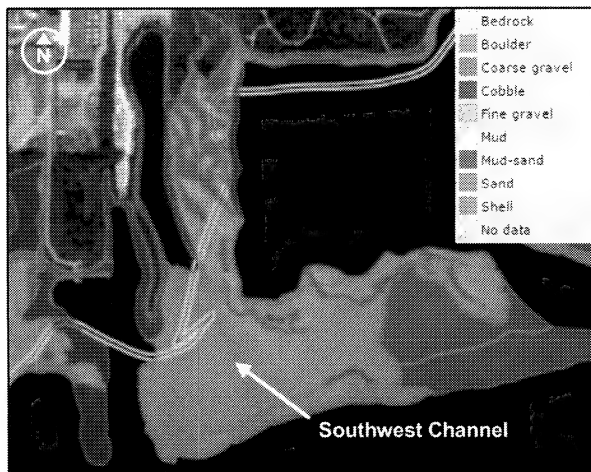


Photo 2 Clam sampling occurring within a quadrat (June 14, 2018).

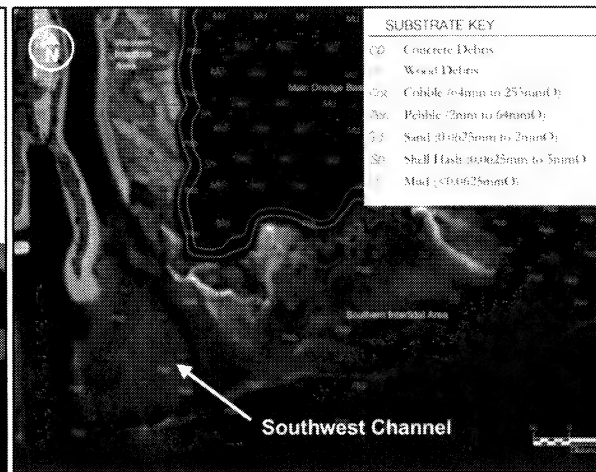
### 3.0 EXISTING CONDITIONS

#### 3.1 Substrates

Background mapping data from BIEAP (characterized at a scale of 250 m<sup>2</sup> or greater), suggested that the area of the proposed Southwest Channel was a broad gravel flat interspersed with sand ridges (BIEAP 2010). However, it is likely that the area was not surveyed in detail for development of the BIEAP map (**Figure 2**). Surficial substrate data collected in 2017 by Balanced did not clearly delineate where transitions in primary substrate types occurred within the proposed Southwest Channel; however, mapping presentations showed that a mixture of cobble, pebble (i.e., gravel) and sand substrates were encountered across the proposed Southwest Channel (**Figure 3**). Hemmera (2013) did not assess the mid-intertidal or low intertidal zones within the proposed Southwest Channel; however, the northernmost portion of the proposed Southwest Channel was assessed and a high sand content, with some patches of gravel and very little cobble was recorded.



**Figure 2** BIEAP Mapping Depicting Fine Gravel Substrate in the Proposed Southwest Channel (BIEAP 2010)



**Figure 3** Balanced Mapping Depicting Cobble, Pebble and Sand Substrate in the Proposed Southwest Channel (Balanced 2017)

Based on the June 2018 field assessment, four substrate types were observed at the proposed Southwest Channel: Cobble (65%+ cobble coverage); Gravel (65%+ gravel coverage); Sand/Shell (65%+ sand/shell coverage); and, Cobble and Sand/Shell (30 to 60% coverage of both Cobble and Sand/Shell).<sup>3</sup> The assessment indicated that there is an approximately 15 m wide band of predominantly cobble substrate at the north end of the proposed Southwest Channel (**Appendix A: Figure 2**), located along and near the top of a slope leading to the Main Basin (**Photo 3**). This is bordered to the south by a berm consisting primarily of sand/shell that ranges in width from approximately 5 to 25 m. There is a notable break in gradient within this sand/shell section (approximately 15%) (**Photo 4**), across an intertidal zone with a flat slope (<5%). The seaward 150 m of the proposed Southwest Channel can be characterized as cobble mixed with sand/shell substrate (**Photos 5 and 6**) which is bisected by an approximately 15 m wide wetted depression (**Photo 7**). Substrate in the wetted depression is primarily cobble, with some higher sand/shell content near the edges of the wetted depression. Moving seaward, the substrate transitions to primarily sand/shell past the lower end of the cobble and sand/shell area. As the intertidal flat transitions to the low intertidal zone (moving towards Burrard Inlet), the substrate is primarily characterized as gravel (i.e., approximately the lower 40 m of the assessed intertidal flat) (**Photo 8**).

In general, the higher northern portion of the sample area can be characterized as primarily cobble substrate, while the majority of the mid-intertidal zone is primarily a mixture of cobble and sand/shell, and the low-intertidal area is primarily gravel substrate. A polygon-based substrate map generated from the sampling is provided in **Appendix A: Figure 2**. Raw data pertaining to substrates can be found in **Appendix B: Table 1**.

<sup>3</sup> Sand and shell were recorded as separate substrates in the field but were then grouped together for habitat mapping and analysis, as they were determined to be functionally similar due to the high sand-sized component of the shell substrate.



**Photo 3** South view showing cobble substrate covered with large amounts of barnacles and mussels (June 14, 2018).



**Photo 4** West view showing the sand/shell berm with minimal invertebrate coverage (June 14, 2018).



**Photo 5** South view showing barnacle and some mussel coverage across cobble and sand/shell substrate (June 14, 2018).



**Photo 6** Southwest view of moderate barnacle coverage with macroalgae across cobble and sand/shell substrate (June 14, 2018).



**Photo 7** Northwest view of the wetted depression bisecting the intertidal flat (June 14, 2018).



**Photo 8** Northwest view of the low intertidal area closest to Burrard Inlet showing high algae coverage and gravel substrate (June 14, 2018).

### 3.2 Habitat Types

Background mapping data from BIEAP (characterized at a scale of 200 m<sup>2</sup> or greater<sup>4</sup>), shows patches of bull kelp (*Nereocystis luetkeana*) present on hard substrates along the low intertidal and shallow subtidal zone at the southern edge of the Southern Intertidal Area (**Figure 4**). A small patch of non-native Japanese wireweed (*Sargassum muticum*) and some sea lettuce (*Ulva* sp.) patches are immediately to the south and north, respectively, of the bull kelp. Sea lettuce is also shown in two patches in the mid-intertidal zone corresponding with shallow depressions in the intertidal flat (e.g., the wetted depression cutting across the proposed Southwest Channel). Broad iodine seaweed (*Prionitis lyallii*) is also shown along the northern section of the wetted depression (**Figure 4**). The BIEAP data did not provide information on encrusting invertebrate (e.g., barnacle and mussel) presence and density at the site.

Balanced (2017) recorded algae and encrusting invertebrate abundance in one transect (T1) overlapping the proposed Southwest Channel using observations of either percent areal coverage (PAC), or individuals per transect (IPT), located within 1 m of T1 (**Figure 5**).<sup>5</sup> The abundance of algae observed in the proposed Southwest Channel ranged from “Rare” to “Sparse” to “Few” dependent on the elevations commonly encountered for each species. Most algae were observed in the low intertidal zone (below 1 m CD)<sup>6</sup> except for Turkish washcloth (*Mastocarpus papillatus*) and sea lettuce (*Ulva fenestrata*) which were recorded as “Sparse” and “Few”, respectively, throughout the mid-intertidal zone. Bay mussels (*Mytilus trossulus*) were

<sup>4</sup> Physical and biological features were characterized using a combination of existing data, field verification undertaken from May to August 2009, and 2005 orthophotographs (Lamagna and Walker 2009).

<sup>5</sup> Balanced used the following categories based on PAC: Rare (<5%); Sparse (5 to 25%); Few (26% to 50%); Common (51% to 75%); and, Abundant (>75%). The following categories were provided based on IPT: Rare (1); Sparse (2 to 5); Few (6 to 10); Common (11 to 30); and, Abundant (>30).

<sup>6</sup> Brown algae in the low intertidal zone were categorized by Balanced based on IPT: Sugar wrack (*Saccharina latissima*), bull kelp (*Nereocystis luetkeana*), and winged kelp (*Alaria esculenta*) were categorized as Few, Sparse and Rare, respectively. Red algae in the low intertidal zone were categorized by Balanced based on PAC: Pacific rose (*Rhodomyenia pacifica*) and red spaghetti (*Gracilaria* sp.) were both categorized as Rare.

common throughout the mid-intertidal zone and acorn barnacles (*Balanus glandula*) were commonly observed along the entire length of the single transect within the proposed Southwest Channel (Balanced 2017).<sup>7</sup>

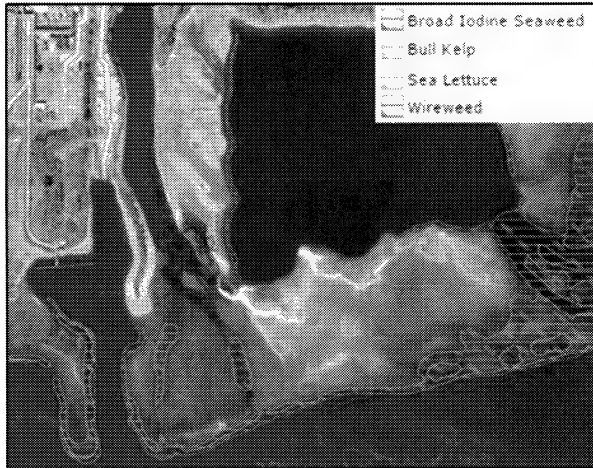


Figure 4 BIEAP Mapping Depicting Sparse Algal Coverage in the SIA (BIEAP 2010).

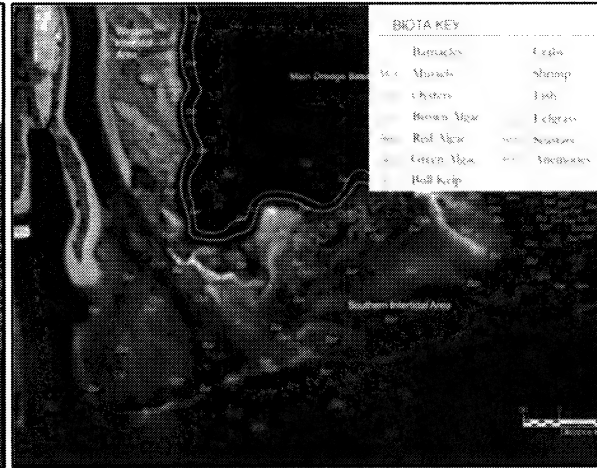


Figure 5 Balanced Mapping Depicting Biota Encountered in the SIA (Balanced 2017).

June 2018 field observations identified acorn barnacles as the primary encrusting invertebrate species observed (**Photo 9**) forming a biogenic habitat throughout much of the proposed Southwest Channel. While mussels (*Mytilus* sp.) were present in most quadrats sampled, the areal coverage by mussels was lower than barnacles (i.e., the mean and median coverage in all quadrats was approximately 10% for mussels and 40% for barnacles). However, mussel coverage was higher in areas with standing water at low tide, and along the edges of the wetted depression cutting across the proposed Southwest Channel (**Photo 10**). Due to the dominance of barnacles throughout the proposed Southwest Channel, areal coverage by barnacles was used as a method to assist with the classification of habitat types. The habitat map generated from the sampling is provided in **Appendix A: Figure 3**. Raw data for the habitat types can be found in **Appendix B: Table 2**.

<sup>7</sup> Balanced recorded barnacle and mussel abundance by PAC. However, the PAC was greater than 100% for some areas (e.g., PAC by barnacles and mussels were both "51 to 75%" at the same elevations). The maximum PAC recorded for a quadrat by Hemmera was 100%. Based on the differing data, these PACs are not directly comparable.





**Photo 9** Acorn barnacles were the primary encrusting invertebrate species with the proposed Southwest Channel (June 14, 2018).



**Photo 10** Higher densities of mussels were observed along the edge of the wetted depression (June 14, 2018).

The results from the sampling indicate that barnacle coverage was high throughout most of the mid-intertidal zone of the proposed Southwest Channel, corresponding with a high percent coverage of cobble substrate (**Photos 3 and 5**). Generally, barnacle coverage was inversely related to percent coverage by sand/shell substrate (**Photo 4**), with coverage decreasing in the lower mid-intertidal zone (**Photo 6**). While barnacle coverage was still high in some of the low intertidal zone (e.g., in gravel areas below 1 m CD), barnacle coverage decreased with increasing algal coverage.

Sea lettuce was the most frequently encountered algae within the proposed Southwest Channel with high coverage in the low intertidal zone (**Photo 8**) and sparser coverage in the lower mid-intertidal zone (**Photo 6**). Algae coverage in the low intertidal zone was significantly higher (**Photo 8**), with species including sea lettuce, winged kelp, sugar wrack, split kelp (*Saccharina groenlandica*), sea felt (*Pylaiella littoralis*) and non-native Japanese wireweed. These low intertidal areas were categorized as “Benthic Algae” habitat zones. The wetted depression cutting across the intertidal flat was categorized as a “Channel” habitat which contained some red algae (including iodine seaweed and sea lace (*Microcladia* sp.)) (**Photo 7**) and moderate barnacle coverage.

The results from the June 2018 assessment generally align with the data from BIEAP (2010) which shows algae presence in low intertidal areas and along the wetted depression and areas with standing water during low tide in the proposed Southwest Channel. Based on interpretation of Balanced’s data (2017), Hemmera recorded a lower abundance of algae in the mid-intertidal area and a higher abundance of algae in the low intertidal area (e.g., below 1 m CD). In terms of abundance of encrusting invertebrates, Hemmera’s data corroborated findings from Balanced suggesting high coverage by barnacles across the majority of the site, with common sightings of mussels.



### 3.3 Bivalve Shellfish

Observations of bivalve shellfish were not recorded by Balanced (2017) during a surficial transect survey in mid-October 2017, although Pacific oysters (*Crassostrea gigas*) were observed at a density of “Few”<sup>8</sup> throughout the Southern Intertidal Area. In late October 2017 clam sampling via dive surveys was undertaken to a depth of 20 cm in two plots in the proposed Southwest Channel, corresponding with the wetted depression and the low intertidal zone (Balanced 2017; sampling locations C11 and C12). Twelve bent-nosed (*Macoma nasuta*) and two manila (*Venerupis philippinarum*) clams were observed in the wetted depression plot (C11), and 21 bent-nosed and two littleneck (*Protothaca staminea*) clams in the low intertidal zone plot (C12; Balanced 2017).<sup>9</sup> Based on benthic sampling, AECOM reported juvenile butter clam (*Saxidomus gigantea*), littleneck clam, bent-nosed clam, and Nuttall’s cockle (*Clinocardium nuttallii*) in the vicinity of the proposed Southwest Channel, with juvenile bent-nosed and littleneck clams being the most abundant (AECOM 2018). Gaper clams (*Tresus* sp.) were identified on the northern dredge slope of the proposed Southwest Channel (AECOM 2018).

To provide more detailed information related to clam abundance and distribution across the proposed Southwest Channel, Hemmera undertook intertidal bivalve shellfish sampling at 11 quadrats along Transect 1 and seven quadrats along Quadrat 2 in June 2018. While there was some variability in the data, generally the highest clam biomass occurred in the low intertidal zone (seaward end) of the proposed Southwest Channel; however, clams were present in all habitat types and elevations sampled throughout the proposed Southwest Channel (**Photos 11 and 12**), including bare sand/shell habitats and areas covered with primarily cobble substrate. While biomass appeared to increase with decreased intertidal elevation, the number of clams in each plot remained relatively consistent across the length of the proposed Southwest Channel. Butter, littleneck and bent-nosed clams occurred throughout most of the proposed Southwest Channel, although bent-nosed clams appeared to occur in larger proportions (per sample biomass) at higher elevations in the intertidal zone. Manila clams were present at the lowest density and only occurred in two plots in the mid-intertidal zone. Comparatively, cockles were observed primarily in the lower mid-intertidal to low intertidal zone and gaper clams occurred only in one plot in the low intertidal zone.

The predicted clam biomass in grams per square metre, number of clams per square metre, and percent composition of clam species per sample based on biomass from field sampling conducted in the proposed Southwest Channel, is provided in **Appendix A: Figure 4**. Raw data pertaining to the bivalve shellfish sampling data can be found in **Appendix B: Table 3**.

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<sup>8</sup> Balanced recorded oyster abundance by IPT.

<sup>9</sup> Neither the size of the diver-operated box sampling device used for bivalve sampling, nor the length of the clams sampled, was provided in the Balanced report. Hence biomass could not be approximated based on the data provided.



**Photo 11** Clams sampled in the lower intertidal zone of proposed Southwest Channel (June 14, 2018).



**Photo 12** Clams sampled in the mid-intertidal zone of proposed Southwest Channel (June 14, 2018).

### 3.4 Other Observations

Shore crabs (*Hemigrapsus* spp.) (**Photo 13**) were abundant throughout much of the proposed Southwest Channel with hundreds observed in quadrats with cobble substrate, and moderate densities observed in areas characterized by gravel substrate. Densities of shore crabs were much lower in sand/shell substrate. Similarly, small sea snails (*Littorina* sp.) were found at high densities (>100 individuals per square metre), positively corresponding with cobble substrate, as well as gravel. Limpets were also observed on some of the cobble substrate at lower densities (ranging up to approximately 20 limpets per square metre) throughout the proposed Southwest Channel. Two quadrats (T1Q6 and T1Q11) in the mid-intertidal zone were also observed to contain live Pacific oysters (**Photo 14**). In the last quadrat on Transect 1 in the low intertidal zone (T1Q28), a live red rock crab (*Cancer productus*), kelp crab (*Pugettia producta*) and saddleback gunnel (*Pholis ornata*) were observed.

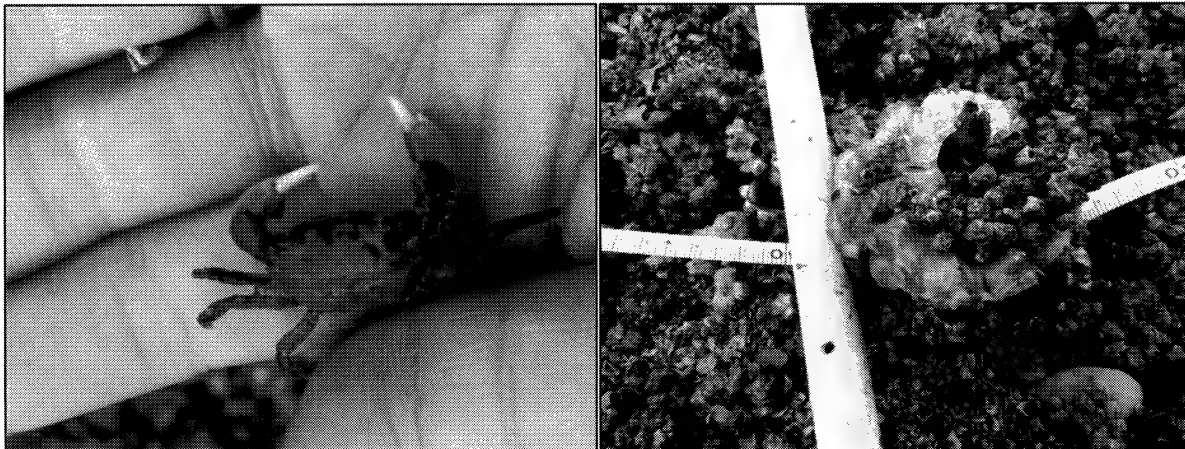


Photo 13 One of many shore crabs observed in the quadrats (June 14, 2018).

Photo 14 A Pacific oyster observed in one of the quadrats (June 14, 2018).

#### 4.0 CONCLUSION

The proposed Southwest Channel can be described as a broad intertidal flat consisting of a mixture of unconsolidated cobble, and sand/shell throughout the mid-intertidal zone and primarily gravel in the low intertidal zone. The intertidal cobble and gravel substrates support a high density of biogenic habitat forming encrusting invertebrates (primarily acorn barnacles and some bay mussels). Oysters are present on surface substrates in the proposed Southwest Channel within the mid-intertidal zone. Bivalve shellfish are present throughout the length of the proposed Southwest Channel, with biomass generally increasing lower in the intertidal zone. This lower intertidal zone supports high coverage by algae, primarily brown and green algal species, which would support fish and invertebrate species associated with near-shore algal habitats. While algal coverage is sparse throughout much of the mid-intertidal zone, there is some coverage by red algae, primarily in areas that remain wetted during low tide (e.g., the wetted depression cutting across the proposed Southwest Channel).

Based on the results of this field assessment, the proposed Southwest Channel can be categorized as moderately to highly productive intertidal flat habitat that provides biogenic habitats that are expected to benefit a variety of commercial, recreational or Aboriginal (CRA) fish species. For example, the existing habitat would benefit species such as red rock crab and Dungeness crab (*Metacarcinus magister*), in addition to motile CRA reef fish species, and juvenile salmonids (e.g., in the low intertidal and shallow subtidal benthic algal habitats).

## 5.0 CLOSURE

We have appreciated the opportunity of working with you on this Project and trust this report meets your requirements. Please feel free to contact the undersigned regarding any questions or further information that you may require.

Report prepared by:  
**Hemmera Envirochem Inc.**



Anne Rutherford, M.Env.Sc., R.P.Bio  
Biologist  
604.669.0424 (159)  
arutherford@hemmera.com

Report Peer Reviewed by:



Scott Toews, M.Sc., R.P.Bio.  
Senior Biologist  
stoews@hemmera.com



Scott Northrup, B.Sc., R.P.Bio.  
Senior Biologist  
snorthrup@hemmera.com

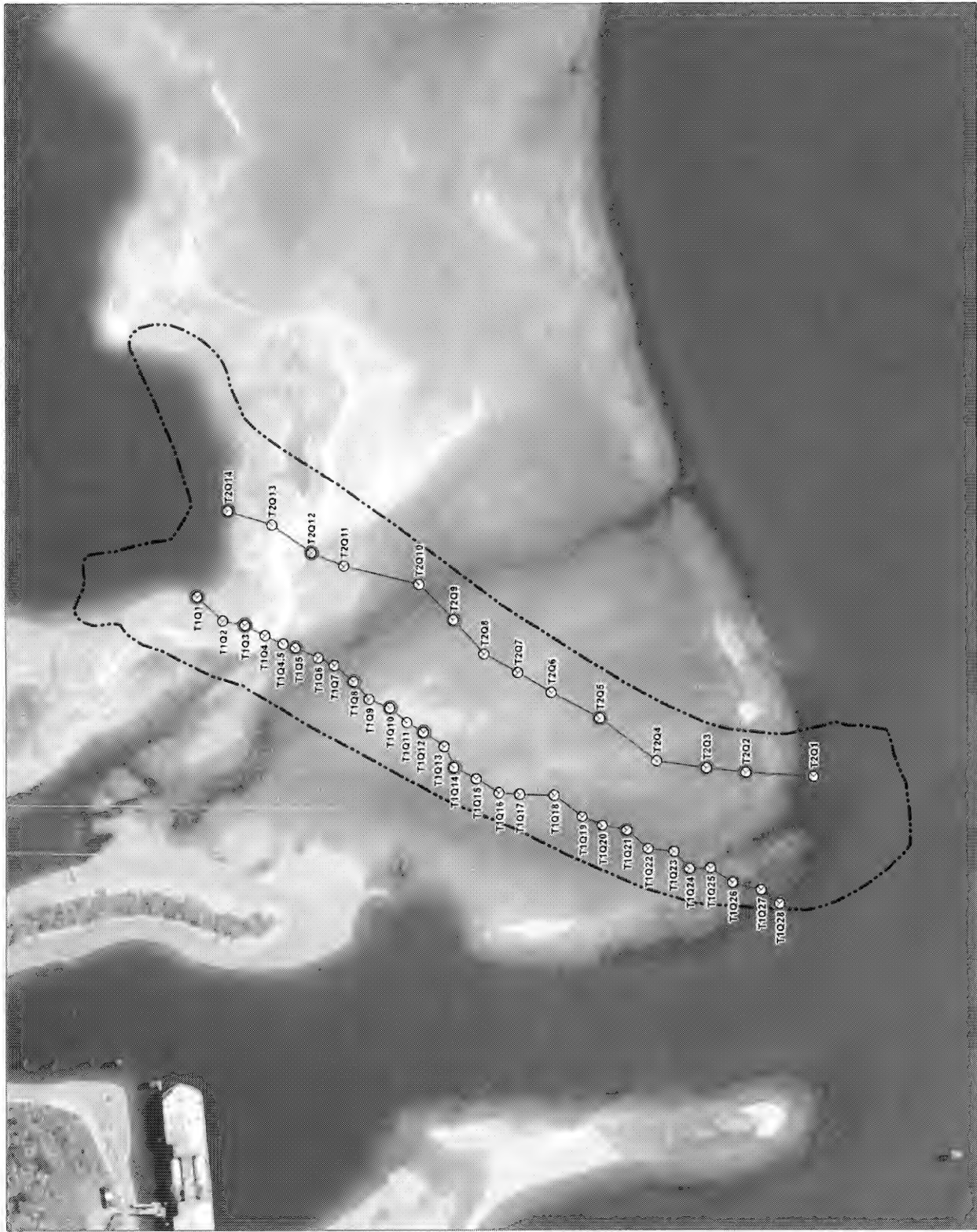
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# **APPENDIX A**

## **Figures**





**Maplewood Marine Restoration Project,  
Biophysical Sampling from  
the Proposed Southwest Channel,  
North Vancouver, BC**

**Transect and Quadrat Locations**

**Legend**

- Quadrat Location
- ⊗ Claim Sampling Location
- - - Transect Location
- - - Proposed Southwest Channel
- - - VFEA Boundary

**Notes:**

1. All mapped features are approximate and should be used for discussion purposes only.
2. This map is not intended to be a "stand-alone" document, but a visual aid of the information contained within the referenced report. It is intended to be used in conjunction with the scope of services and limitations described therein.

**Sources:**

- Proposed Southwest Channel: AECOM, 2018
- Aerial Image: ESRI World Imagery
- Street Map: Google Maps, 2018

**Scale:**

1:500

NAD 1983 UTM Zone 10N

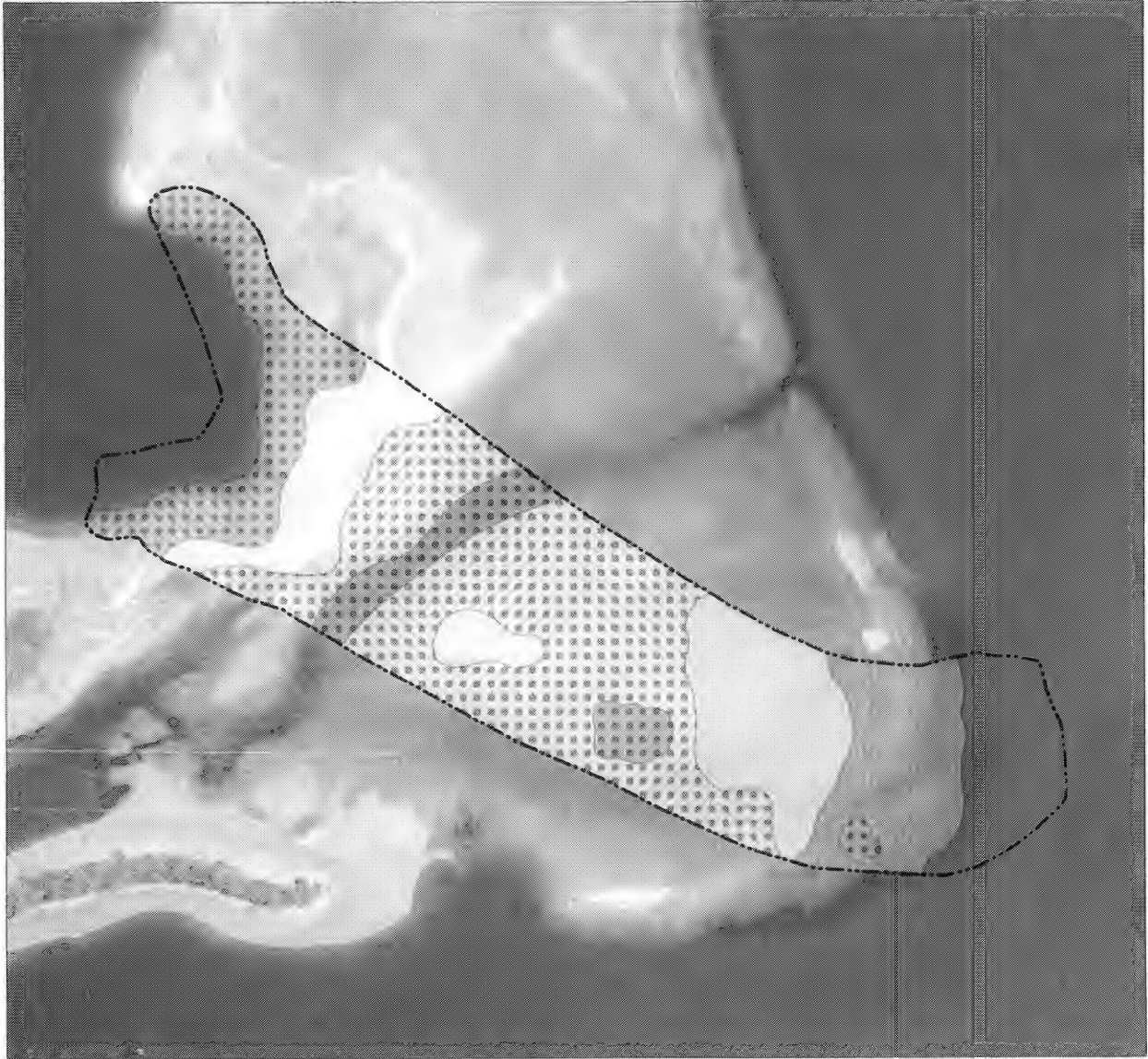
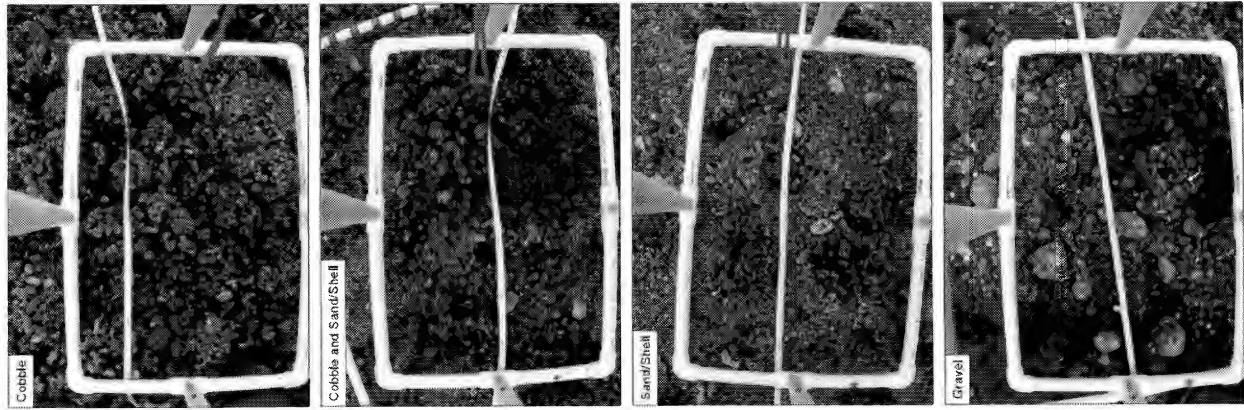
Map Scale: 1" = 125'

Production Date: Sep 7, 2018

Figure 1

**Hemmera**  
ANALYTICS COMPANY

**BOB'S**  
**VANCOUVER**



Maplewood Marine Restoration Project,  
Biophysical Sampling from  
the Proposed Southwest Channel,  
North Vancouver, BC

### Surficial Substrates

#### Legend

- Cobble (65%+)
- Cobble and Sand/Shell (33 to 65% of each substrate)
- Sand/Shell (65%+)
- Gravel (65%+)
- Proposed Southwest Channel
- 1/4° Boundary

#### Notes

1. All mapped features are approximate and should be used for discussion purposes only.
2. This map is not intended to be a "stand-alone" document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the report's text and the map's description.

#### Sources

- Proposed Southwest Channel: AECOM, 2018
- Aerial Image: ESRI World Imagery

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1:1,500

0 10 20 30 40 50 60 70 80 90 100

Meters

NAD 1983 UTM Zone 10N

Map Date: 11/1/18

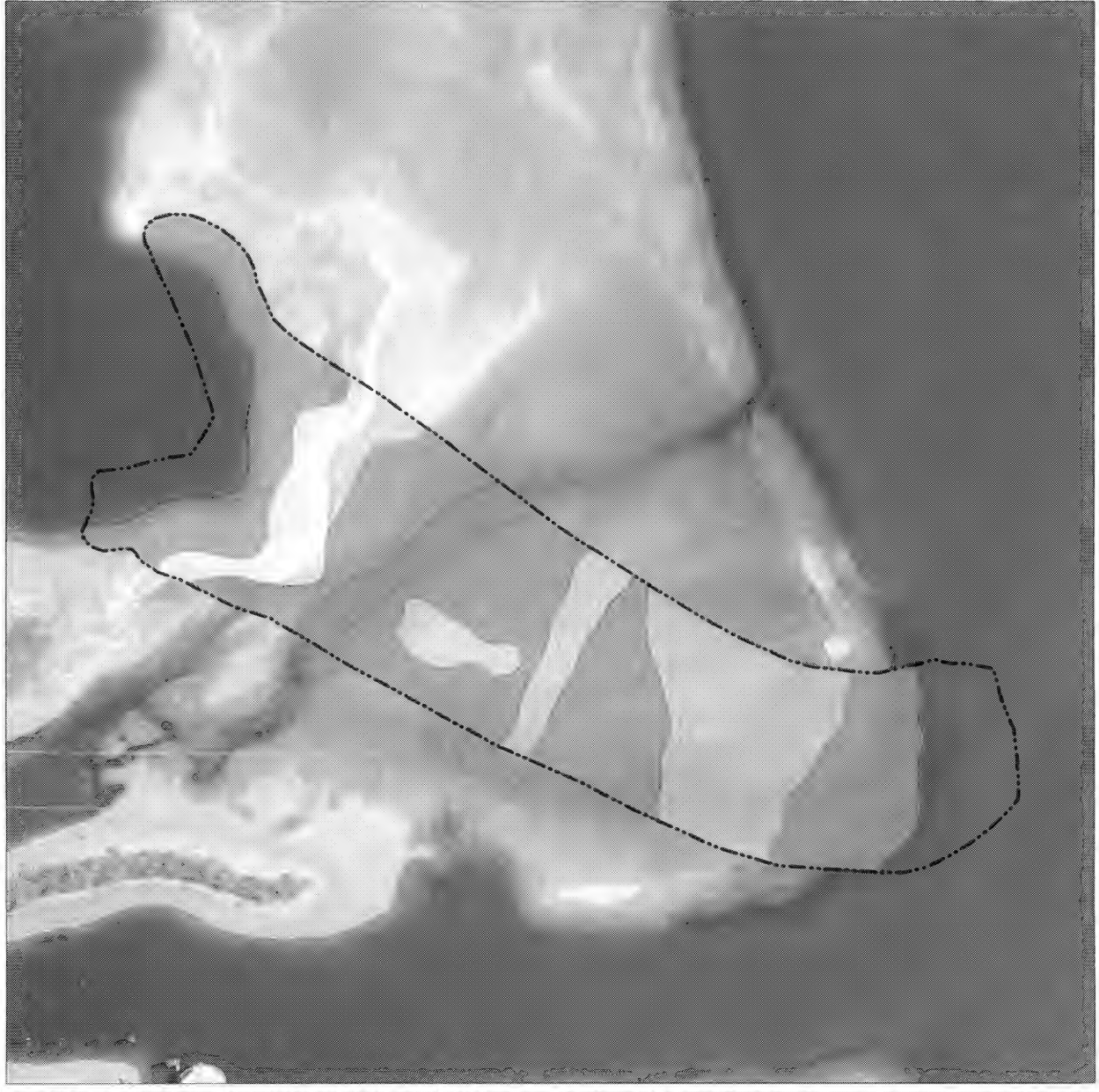
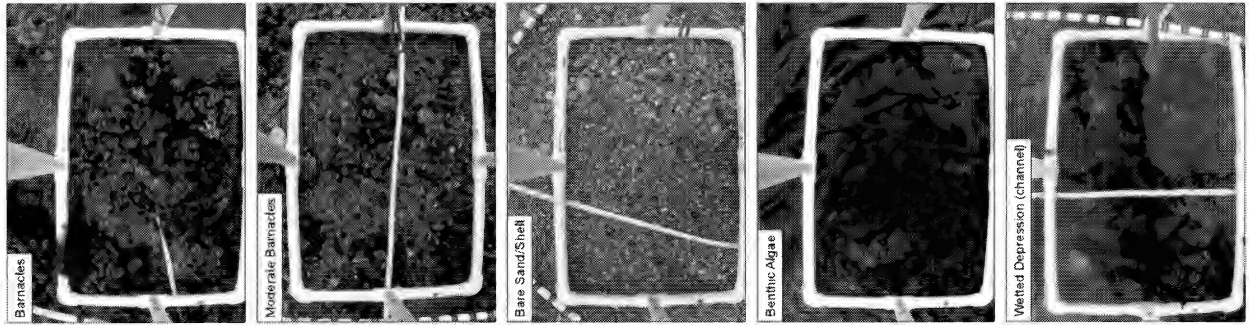
HEMERA

Production Date: May 7, 2018

Figure 2

**Hemmera**  
PORT OF  
Vancouver





Maplewood Marine Restoration Project,  
Biophysical Sampling from  
the Proposed Southwest Channel,  
North Vancouver, BC

#### Dominant Habitat Types

- Legend**
- Barnacles (>30% barnacle coverage)
  - Moderate Barnacles (10 to 30% barnacle coverage)
  - Bare Sand/Shell
  - Benthic Algae (coverage by benthic algae in the low intertidal zone)
  - Wetted Depression (Channel)
  - Proposed Southwest Channel
  - VEPA Boundary

#### Notes

1. All mapped features are approximate and should be used for discussion purposes only. This map is intended to be a "top-down" document, but a virtual set of the information contained within the referenced report. It is intended to be used in conjunction with the scope of services and limitations described herein.

#### Sources

- Proposed Southwest Channel, AECOM, 2018
- Aerial Image, ESRI World Imagery

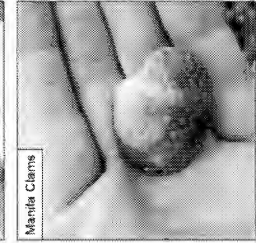
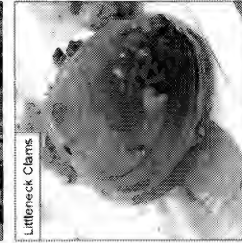
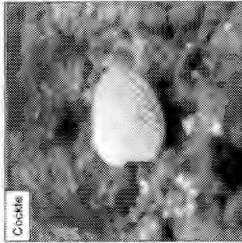
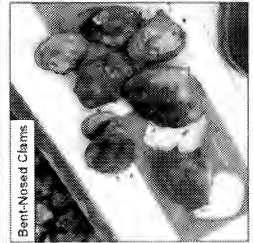
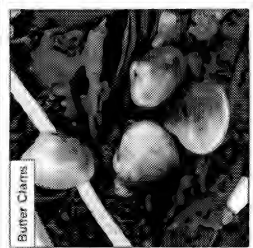
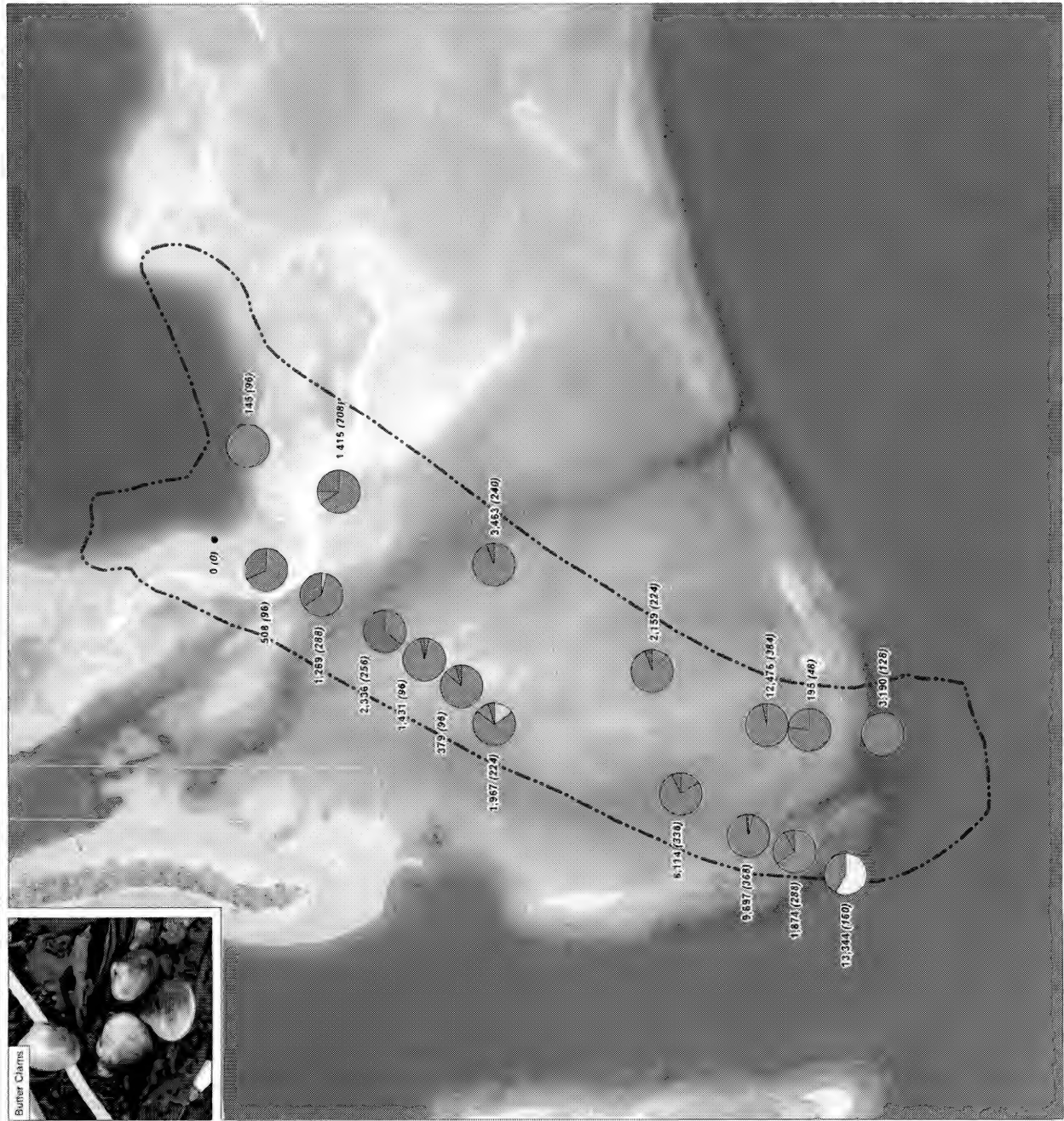


NAD 1983 UTM Zone 18N  
Page Size: 11 x 17

Production Date: Sep 7, 2018

Figure 3

**Hemmera**  
PORT OF  
vancouver



Maplewood Marine Restoration Project,  
Biophysical Sampling from  
the Proposed Southwest Channel,  
North Vancouver, BC

**Intertidal Clam Data**

**Legend**

- Proposed Southwest Channel
- VEPA Boundary
- Sampling Localities (No Clam Observations)
- 145 Total Clam Density (g/m<sup>2</sup>)
- 96 Number of Clams per m<sup>2</sup>

**Clam Biomass Distribution**

- Bent-Nosed Clam (*Macoma nasuta*)
- Butter Clam (*Saxidomus gigas*)
- Cockle (*Chorocardium nuttallii*)
- Gaper Clam (*Tresus nuttallii*)
- Littleneck Clam (*Proclithaca staminea*)
- Manila Clam (*Venerupis philippinarum*)

**Notes**

- All mapped features are approximations and should be used for discussion purposes only.
- This data is not intended to be a "stand-alone" document, but a visual aid of the information contained within the referenced Report. It is intended to be used in conjunction with the scope of services and limitations described therein.

**SOURCES**

- Proposed Southwest Channel, NECCM, 2018
- Canal Image, Vancouver, 2017
- Aerial Image, CSN World Imagery

Scale: 1:1000

Map Scale: 1:1000

NAD 1983 UTM Zone 10N

Figure 4

88955-05

Production Date: Sep 7, 2018

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An American Company

**PONT OF VANCOUVER**

# **APPENDIX B**

## **Field Data**



Appendix B: Field Data - Table 1, Substrate Data

Quadrat ID	Time Sampled	Distance on Transect (m)*	Boulder Coverage (%)	Cobble Coverage (%)	Gravel Coverage (%)	Sand and Shell Coverage (%)	Substrate Classification
T1Q01	10:25	0		90		10	Cobble
T1Q02	10:40	10	5	95			Cobble
T1Q03	14:23	40				100	Sand and Shell
T1Q04	14:35	60			1	99	Sand and Shell
T1Q04.5	14:47	80				100	Sand and Shell
T1Q05	11:50	70	5	50		45	Cobble/Sand and Shell
T1Q06	10:45	20		70		30	Cobble
T1Q07	11:00	30	5	65	15	15	Cobble
T1Q08	12:00	80		50		50	Cobble/Sand and Shell
T1Q09	12:05	90		30	10	60	Cobble/Sand and Shell
T1Q10	15:08	100	10			90	Sand and Shell
T1Q11	12:15	100		30		70	Sand and Shell
T1Q12	12:17	110		55		45	Cobble/Sand and Shell
T1Q13	12:27	120		60		40	Cobble/Sand and Shell
T1Q14	12:28	130		60		40	Cobble/Sand and Shell
T1Q15	12:37	140		40		60	Cobble/Sand and Shell
T1Q16	12:40	150		40	10	50	Cobble/Sand and Shell
T1Q17	11:05	35		75		25	Cobble
T1Q18	11:10	40		65	10	25	Cobble
T1Q19	12:43	160	15	45		40	Cobble/Sand and Shell
T1Q20	12:45	170		35		65	Sand and Shell
T1Q21	15:12	120		10	5	85	Sand and Shell
T1Q22	12:50	180		40		60	Cobble/Sand and Shell
T1Q23	15:14	140		20	10	70	Sand and Shell
T1Q24	15:17	160		20		80	Sand and Shell
T1Q25	13:30	250		25	65	10	Gravel
T1Q26	11:40	50		65	20	15	Cobble
T1Q27	13:41	260		10	90		Gravel
T1Q28	13:43	270		20	70	10	Gravel
T2Q01	14:00	0				10	Gravel
T2Q02	14:11	20		25	65	10	Gravel
T2Q03	15:27	180		10	10	80	Sand and Shell
T2Q04	15:35	200		5		95	Sand and Shell
T2Q05	15:38	220		25		75	Sand and Shell
T2Q06	12:53	190		30	20	50	Cobble/Sand and Shell
T2Q07	12:56	200		30	10	60	Cobble/Sand and Shell
T2Q08	13:06	210		60		40	Cobble/Sand and Shell
T2Q09	13:08	220		60	10	30	Cobble/Sand and Shell
T2Q10	13:10	230		30	20	60	Cobble/Sand and Shell
T2Q11	13:27	240		35	10	55	Cobble/Sand and Shell
T2Q12	15:50	240		15		85	Sand and Shell
T2Q13	15:52	260			5	95	Sand and Shell
T2Q14	11:45	60	10	80		10	Cobble

Substrate Classification Legend

Cobble = 65%+ cobble coverage

Gravel = 65%+ gravel coverage

Sand and Shell = 65%+ shell coverage

Cobble/Sand and Shell = 30 to 60% coverage of both cobble, and sand/shell

\*Note: Transect 1 was sampled from north to south at 10 m intervals while

Transect 2 was sampled from south to north at 20 m intervals

Appendix B: Field Data - Table 2. Habitat Data

Quadrat ID	Time Sampled	Distance on Transect (m)*	Sea Lettuce (Ulva) Coverage	Turkish Washcloth (Mastocarpus) Coverage	Other Vegetation Coverage	Barnacle (Balanus) Coverage	Mussel* (Mytilus) Coverage	No. Shore Crabs (Hemigrapsus)	No. Snails (Littorines)	No. Other Invertebrates*	Habitat Classification***
T1Q01	10:25	0				90%	10% >100		>100		Bar
T1Q02	10:40	10				75%	25% >100		>100		Bar
T1Q03	10:45	20				<5%					Sh
T1Q04	11:00	30				<5%		5			Sh
T1Q04.5	11:05	35				<5%	20% >100		>100	>5 limpets	Sh
T1Q05	11:10	40				75%	10% >100		>20	>10 limpets, 1 oyster	Bar
T1Q06	11:40	50				20%	10%			5 limpets	Ch
T1Q07	11:45	60			10% microcladia, 40% prionitis	60%	10% >100		>20		Bar
T1Q08	11:50	70		5%		30%	10% >100		>20		MBar
T1Q09	12:00	80		1%		10%	2% 10+		>20		MBar
T1Q10	12:05	90				25%	5% >100		>100	5 oysters	MBar
T1Q11	12:15	100				40%	10% >100		>100		Bar
T1Q12	12:17	110		1%		55%	5% >100		>100		Bar
T1Q13	12:27	120				55%	5% >100		>100		Bar
T1Q14	12:28	130		<1%		10%	5% >100		>100		MBar
T1Q15	12:37	140		1%		35%	5% >100		>20		Bar
T1Q16	12:40	150		1%		65%	10% >100		>20		Bar
T1Q17	12:43	160		<1%		40%	15% >100		>100		Bar
T1Q18	12:45	170				25%	10% >100		>20		MBar
T1Q19	12:50	180				10%	10% >100		>20	20 limpets	MBar
T1Q20	12:53	190	<1%			10%	10% >100		NR	NR	MBar
T1Q21	12:56	200				10%	10% >100		NR	NR	MBar
T1Q22	13:06	210	<1%		1% sugar kelp, 40% sea felt	20%	20% >20		NR	NR	MBar
T1Q23	13:08	220	15%		15% sargassum	20%	5% >20		NR	NR	MBar
T1Q24	13:10	230				90%	1% >20		NR	NR	BeAl
T1Q25	13:27	240	25%			90%	1% >50		NR	NR	BeAl
T1Q26	13:30	250	40%			90%			NR	NR	BeAl
T1Q27	13:41	260	40%			90%			NR	NR	BeAl
T1Q28	13:43	270			20% sargassum, 30% split kelp, 30% sugar kelp, 10% alaria				NR	NR	BeAl
T2Q01	14:00	0	20%		50% alaria, 20% sugar kelp, 1% split kelp	5%			NR	NR	BeAl
T2Q02	14:11	20	15%			30%	>20		NR	NR	MBar
T2Q03	14:23	40	5%			20% <5%	>20		NR	NR	MBar
T2Q04	14:35	60	5%			15%	5% >20		NR	NR	MBar
T2Q05	14:47	80	45%			30%	40% >100		NR	NR	MBar
T2Q06	15:08	100				60%	20% >100		NR	NR	Bar
T2Q07	15:12	120				30%	5% >100		NR	NR	MBar
T2Q08	15:14	140				60%	10% >100		NR	NR	Bar
T2Q09	15:17	160				75%	10% >100		NR	NR	Bar
T2Q10	15:27	180			10% microcladia, 20% prionitis		10%		NR	NR	Ch
T2Q11	15:35	200				75%	10% >100		NR	NR	Bar
T2Q12	15:38	220				10%	10% >20		NR	NR	MBar
T2Q13	15:50	240				5%	>20		NR	NR	Sh
T2Q14	15:52	260				90%	5% >100		NR	NR	Bar

## Habitat Classification Legend

Barnacles (Bar) = >30% barnacle coverage  
 Moderate Barnacles (MBar) = 10 to 30% barnacle coverage  
 Bare Sand/Shell = <10% barnacle coverage  
 Benthic Algae (BeAl) = Coverage by benthic algae in the low intertidal zone  
 Channel (Ch) = Submerged substrate

\*Mussel coverage was generally low with an average and median coverage of approximately 10% across the sampled quadrats. In comparison, the average and median coverage by barnacles across all quadrats was approximately 40%. Mussel coverage was higher in depressed areas with standing water at low tide and along edging channels where they appeared to be more dominant.

\*\*NR = Not Recorded, Invertebrates not recorded, as this information can be extrapolated based on existing observations

\*\*\*Habitat categories were defined by the primary biological component (i.e., barnacle coverage).



Appendix B: Field Data - Table 3, Clam Data

Quadrat	BC (g/.0625 m <sup>2</sup> )	No. BC (per .625 m <sup>2</sup> )	BN (g/.0625 m <sup>2</sup> )	No. BN (per .625 m <sup>2</sup> )	CC (g/.0625 m <sup>2</sup> )	No. CC (per .625 m <sup>2</sup> )	GP (g/.0625 m <sup>2</sup> )	No. GP (per .625 m <sup>2</sup> )	LN (g/.0625 m <sup>2</sup> )	No. LN (per .625 m <sup>2</sup> )	MA (g/.0625 m <sup>2</sup> )	No. MA (per .625 m <sup>2</sup> )	Total Biomass (g/.0625 m <sup>2</sup> )	Density (g/m <sup>2</sup> )	No. Clams per .0625 m <sup>2</sup>	No. Clams per 1 m <sup>2</sup>
T1Q01	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0	0
T1Q03	0.00	0	10.32	1	0.00	0	0.00	0	21.43	5	0.00	0	31.75	508	0	96
T1Q05	0.07	1	26.53	12	0.00	0	0.00	0	49.30	4	3.44	0	75.34	1269	18	288
T1Q08	52.42	2	93.61	14	0.00	0	0.00	0	0.00	0	0.00	0	146.03	2336	16	256
T1Q10	53.56	3	3.28	2	0.00	0	0.00	0	0.00	0	0.00	0	89.43	1431	6	96
T1Q12	1.90	1	1.38	2	0.00	0	0.00	0	26.40	4	0.00	0	23.68	379	6	96
T1Q14	12.32	2	5.99	6	0.00	0	0.00	0	83.60	4	19.03	2	122.95	1967	14	224
T1Q21	292.71	13	28.26	6	0.00	0	0.00	0	61.13	2	0.00	0	382.10	6114	21	336
T1Q24	574.61	18	11.27	4	0.00	0	0.00	0	20.16	1	0.00	0	606.04	9697	23	368
T1Q26	31.01	13	8.83	4	77.21	1	0.00	0	0.00	0	0.00	0	117.15	1874	18	288
T1Q28	349.29	7	0.00	0	0.00	0	484.72	3	0.00	0	0.00	0	834.01	13444	10	160
T2Q01	197.99	7	1.36	1	0.00	0	0.00	0	0.00	0	0.00	0	199.38	3190	8	128
T2Q02	2.59	1	0.00	0	0.00	0	0.00	0	9.61	0	0.00	0	12.21	195	3	48
T2Q03	747.75	17	28.62	4	2.10	1	0.00	0	1.30	0	0.00	0	775.78	12476	24	384
T2Q05	113.28	10	7.07	3	14.59	1	0.00	0	0.00	0	0.00	0	134.94	2159	14	224
T2Q09	203.80	6	12.65	9	0.00	0	0.00	0	0.00	0	0.00	0	216.46	3463	15	240
T2Q12	7.93	3	22.45	5	0.00	0	0.00	0	58.04	5	0.00	0	88.43	1415	13	208
T2Q14	9.08	8	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	9.08	145	6	96

Clam digs were undertaken within select 1 m quadrats (e.g., where a change in habitat was observed and at intermittent locations) along both transects. A smaller 25 cm x 25 cm quadrat was used for the clam digs. Digs occurred to a depth of 25 cm using a sieve size of 0.25".

\*Clam species:  
 BC = butter clam (*Saxidomus gigantea*)  
 BN = bent-nosed clam (*Macoma nasuta*)  
 CC = Nuttall's cockle (*Clinocardium nuttalli*)  
 GP = gaper clam (*Tresus* sp.)  
 LN = littleneck clam (*Protothaca staminea*)  
 MA = manila clam (*Venerupis philippinarum*)

# **APPENDIX B**

## **Construction Environmental Management Plan**

# **Maplewood Marine Restoration Project**

## ***Construction Environmental Management Plan***

Prepared for:  
**Vancouver Fraser Port Authority**  
100 The Pointe, 999 Canada Place  
Vancouver, BC V6C 3T4

Prepared by:  
**Hemmera Envirochem Inc.**  
18<sup>th</sup> Floor, 4730 Kingsway  
Burnaby, BC V5H 0C6

File: 989-565-05  
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## List of Abbreviations and Acronyms

Abbreviation or Acronym	Definition
BMP	Best Management Practice
CD	Chart Datum
CEMP	Construction Environmental Management Plan
CEP	Centerm Expansion Project
CRA	Commercial, Recreational or Aboriginal
D <sub>50</sub>	Average (Median) Diameter
EM	Environmental Monitor
EPP	Environmental Protection Plan
HEP	Habitat Enhancement Program
IM	Independent Monitor
MBCA	Migratory Birds Convention Act
MMRP	Maplewood Marine Restoration Project
PER	Project and Environmental Review
Project	Maplewood Marine Restoration Project
QEP	Qualified Environmental Professional
VFPA	Vancouver Fraser Port Authority
VHF	Very High Frequency

## 1.0 INTRODUCTION

The Maplewood Marine Restoration Project (MMRP, or "Project") is a habitat enhancement project proposed by the Vancouver Fraser Port Authority (VFPA) Habitat Enhancement Program (HEP). HEP is a VFPA program whose goal is to balance a healthy environment with infrastructure development opportunities. HEP creates and enhances fish and wildlife habitat for habitat banking purposes, use as offsetting for port infrastructure projects, or a combination of both. MMRP is a proposed HEP project anticipated to enhance approximately seven hectares of low-value marine habitat into higher-value marine habitat for fish, birds, and other wildlife. Proposed habitat enhancements include creation of a tidal channel, subtidal rock reef habitat, eelgrass habitat, and intertidal flat habitat.

The following Construction Environmental Management Plan (CEMP) was developed with reference to VFPA's *Project and Environmental Review Guidelines – Construction Environmental Management Plan* (PMV 2015). This CEMP, prepared by Qualified Environmental Professionals (QEPs), describes how the Project will be managed during construction to avoid adverse impacts to the environment. This CEMP is based on the design and Project details outlined in the 60% Design Report (AECOM 2018).

Once the Project is awarded, the selected Contractor will be responsible for developing a Project-specific Environmental Protection Plan (EPP) to avoid potential adverse environmental impacts based on specific equipment and refined construction methodologies. The Contractor's EPP will be reviewed by VFPA's HEP and will be provided to VFPA's Project and Environmental Review (PER) team to confirm that it conforms to the requirements of this CEMP and any conditions of regulatory approvals/permits. Throughout construction, the Contractor will ensure that all Project construction activities adhere to this CEMP and the Contractor's EPP, in addition to applicable regulatory requirements.

## 2.0 PROJECT INFORMATION

### 2.1 LOCATION

The Project lies within VFPA jurisdiction on the north shore of Burrard Inlet, approximately two kilometres east of the Ironworkers Memorial Bridge. The Project is immediately south of a wildlife conservation area (the Maplewood Flats Conservation Area), which is leased to Environment and Climate Change Canada and is managed by the Wild Bird Trust of British Columbia (Figure 1).

The Project site covers approximately seven hectares and consists of two distinct areas: The Northeast Basin, centered at approximately 49°18'10" N and 123°00'05" W; and, the Southwest Channel area (located in the Southern Intertidal Area), centered at approximately 49°17'55" N and 123°00'25" W (Figure 1).





**Figure 1**      **Project Site Location and Layout**

## 2.2 PROJECT DESCRIPTION

Habitat in the Northeast Basin will be created by beneficially using approximately 87,000 m<sup>3</sup> of dredge material from the Southern Intertidal Area (resulting from the creation of the proposed Southwest Channel), and approximately 95,000 m<sup>3</sup> of imported clean fill material, to raise the elevation of the existing substrate. Fraser River sand, or a suitable clean alternate (e.g., approved Sechelt sand), is proposed as the additional fill material. This imported material is anticipated to be placed over the dredge material from the Southwest Channel to form the upper sediment layer in the Northeast Basin.

The newly created intertidal flat habitat and shallow subtidal eelgrass habitat in the Northeast Basin will be located between approximately +2.0 m and -2.0 m chart datum (CD). Construction of a rock dyke is required to contain the fill material needed to establish the intertidal and shallow subtidal areas in the Northeast Basin. Subtidal rock reef habitat south of the rock dyke, at the southernmost end of the Northeast Basin, will be constructed by placing appropriately sized rock material between approximately -3.0 m and -4.0 m CD. The rock reef habitat will be constructed using rock of varying diameter, with an average (median) diameter (D<sub>50</sub>) of approximately 600 mm. A total of approximately 8,500 m<sup>3</sup> of rock material is anticipated to be placed in the Northeast Basin.

Rock reef habitat will also be created in the Southern Intertidal Area following dredging of the Southwest Channel. The Southwest Channel will improve tidal flushing in the Maplewood Basin and enhance nutrient transport, improve water quality, reduce siltation of marine vegetation, and facilitate suspension and distribution of eggs and larvae of pelagic spawning fish and invertebrates, including marine vegetation spores. A total of approximately 14,000 m<sup>3</sup> of rock material will be placed in the Southwest Channel, both along the base of the channel to function as subtidal rock reef habitat, and along the side slopes of the excavated Southwest Channel to protect against scour from tidal currents as well as to function as rock reef habitat. The rocks along the side slopes will have a D<sub>50</sub> of approximately 500 mm, and the rocks on the base of the channel will have a D<sub>50</sub> of approximately 600 mm. The rock in the Southwest Channel will be placed between approximately +2.0 m and -4.0 m CD.

Barge-mounted construction equipment will be required to cross over the shallow Southern Intertidal Area during a high tide before the start of dredging. It is anticipated that the Southwest Channel will be dredged using a barge-mounted clam-shell dredge. To facilitate placement of material from the Southwest Channel into the Northeast Basin, it is anticipated that dredging will start from the inner (i.e., northeastern) end of the channel to avoid transporting and potentially grounding loaded, or partially-loaded, scows on the shallow Southern Intertidal Area. Once the Southwest Channel is dredged to design grade (i.e., -4.0 m CD), it is anticipated that loaded material scows will be able to enter/exit the Project site during low tides (utilizing the Southwest Channel). Construction methodology details will be refined as the Project advances to a procurement-ready stage.

Following construction, stabilization, and a final survey of the eelgrass bed location, native common eelgrass (*Zostera marina*) will be transplanted from suitable donor beds into the Northeast Basin.

## 2.3 PROJECT SCHEDULE

Detailed design, permitting, and consultation and engagement will be undertaken throughout 2018 and 2019. Construction is anticipated to commence in mid- to late-2019. A preliminary proposed construction schedule (AECOM 2018) is provided in **Table 1**. A detailed schedule will be determined following procurement and Contractor selection.

**Table 1 Proposed Construction Schedule**

Task	Proposed Dates
Mobilization	Q3 2019
Southwest Channel Dredging and Rock Placement	Q3 2019 to Q1 2020
Fill Placement in Northeast Basin – Dredged Material	Q3 2019 to Q1 2020
Construction of Containment Dyke	Q3 2019 to Q1 2020
Subtidal Rock Reef Construction at Toe of Containment Dyke	Q3 2019 to Q1 2020
Fill Placement in Northeast Basin – Imported Fill	Q3 2019 to Q1 2020
Habitat Establishment (e.g., Eelgrass Transplantation)	Q1 2020 to Q4 2021

### 2.3.1 Timing Windows

The annual marine/estuarine timing window of least-risk for Burrard Inlet is August 16<sup>th</sup> to February 28<sup>th</sup>. This refers to the time period of reduced risk for important commercial, recreational or Aboriginal (CRA) fish species. The majority of the construction work is scheduled to occur during this least-risk timing window to mitigate risk of negative effects to juvenile salmonids. However, due to the potential material settlement time required for sediment placement in the Northeast Basin, material placement may extend beyond the end of the least-risk timing window (e.g., post-February 28<sup>th</sup>). Any work outside the window would occur with appropriate mitigation in place.

The federal *Migratory Birds Convention Act, 1994* (MBCA) exists to protect and conserve migratory birds—as populations and individual birds—and their nests. Under the MBCA, no person shall, without lawful excuse, be in possession of a migratory bird or nest, or, buy, sell, exchange or give a migratory bird or nest or make it the subject of a commercial transaction. This Act restricts the deposit of harmful substances in waters or areas frequented by migratory birds. As there is minimal anticipated overlap between birds covered under the MBCA and Project construction activities, either spatially (i.e., no construction activities proposed in the upland) or temporally (i.e., the majority of construction is proposed

outside the general nesting period of migratory birds<sup>1</sup> in the region: mid-March to mid-August), contravention of the MBCA is not anticipated.

However, the Project site is located adjacent to upland areas where there is potential to indirectly affect birds and their active nests (e.g., due to noise). Should construction activities overlap with the general nesting period of migratory birds in the region, extra precaution will be exercised to avoid causing harm to birds and/or their active nests and eggs.

## **2.4 SITE DESCRIPTION**

The Project site was historically an intertidal flat. Throughout the 1900s it was altered by activities associated with dredging, gravel extraction, logging operations, and industrial use, resulting in the development of the relatively deep Maplewood Basin (comprising the Northeast Basin and larger Main Basin), and an intertidal area to the south of the Maplewood Basin, where the Southwest Channel is proposed. Due to the depth, the lower portions of Northeast Basin (approximately -9.0 m CD) and Main Basin are subject to poor flushing. Biological surveys have shown that, generally, the Project site has relatively low habitat value with low diversity and abundance of marine life (Balanced 2017). The basins are dominated by fine sediments. There is also some wood debris accumulation present in the Northeast Basin from historic log handling operations.

A biophysical survey of the Project site was conducted in the fall of 2017 and consisted of both underwater dive surveys and land-based assessments. Additional information on the assessments and existing biological conditions is available in the Biophysical Survey (Balanced 2017) and the Ecological Conditions Report (Hemmera 2018a). Archaeological assessments of the Project site (including an Archaeological Overview Assessment and a Preliminary Field Reconnaissance) were undertaken in early 2018 (ILP 2018).

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<sup>1</sup> The general nesting period for migratory birds in Canada (Government of Canada 2017) covers most federally protected migratory bird species; raptor nesting windows are more varied, and are described in *Guidelines for Raptor Conservation During Urban and Rural Land Development in British Columbia* (MOE 2013).

### 3.0 CONTACT INFORMATION AND RESPONSIBILITIES

#### 3.1 KEY PROJECT PERSONNEL

The following table (**Table 2**) provides the contact information of some of the key Project personnel. As the Project has not yet been awarded, this list is preliminary only and will be updated in the Contractor's EPP following tender and award of the Project.

**Table 2 Project Contact List**

Name	Company	Role	Phone Number
Charlotte Olson	VFPA HEP	Project Manager	604-665-9590
Lisa McCuaig	VFPA PER	Regulator	604-665-9527
TBD	TBD	Construction Manager	TBD
TBD	TBD	Construction Foreman	TBD
TBD	TBD	Environmental Monitor	TBD
TBD	TBD	HEP Environmental Monitor (Independent Monitor)	TBD

#### 3.2 ENVIRONMENTAL MONITOR RESPONSIBILITIES

To ensure adherence to the environmental protection objectives and conditions of Project permits and the requirements of this CEMP and the Contractor's EPP, the Contractor will be required to retain a QEP in the role of the Project's Environmental Monitor (EM), who will work on behalf of the Contractor. The EM will need to be approved by VFPA's HEP prior to Project commencement to ensure they meet the qualifications as outlined in the Project procurement documents. The EM will be responsible for ensuring that mitigation measures are properly implemented by the Contractor and are functioning as intended. The EM may indicate that the mitigation measures be adapted if the need arises. Typical responsibilities of the EM include those identified below; however, specific items may be updated based on refinements to the construction methodology following selection of the Contractor and throughout construction.

- The EM will review the Contractor's work procedures to ensure functionality and compliance with this CEMP, the Contractor's EPP and applicable regulations, standards and best management practices (BMPs).
- The EM will communicate the requirements of Project permits, this CEMP and the Contractor's EPP to the Project construction team members during pre-job and tailgate meetings.
- An appropriate schedule for environmental monitoring will be established between the EM, Project Manager and regulatory agencies. The EM will be on-site as per the schedule established between parties prior to Project start. However, the monitoring frequency may be adapted depending on specific site conditions and work progress.

- Monitoring events will be undertaken throughout construction at an appropriate frequency based on the specific work tasks (e.g., dredging and fill placement), and potential for adverse effects to occur.
  - Monitoring will be conducted with greater frequency during periods of inclement weather (e.g., heavy precipitation, and rough oceanic conditions).
  - Full-time monitoring will be undertaken during start-up of any new phases of the Project and during installation of environmental protection measures (e.g., installation of a silt curtain).
- The EM will remain on-call during non-critical work periods to respond to emerging environmental issues.
- The EM will support and liaise directly with the Contractor to provide technical advice for the purpose of resolving situations that may affect the environment. The EM will advise the Contractor if construction activities have caused, or are likely to cause, an environmental incident and make recommendations for corrective action.
- The EM will have the authority to modify and/or halt any construction activity at any time if deemed necessary for the protection of the environment.
- The EM will maintain complete records of activities related to the implementation of the CEMP and Contractor's EPP. This will include any measurements taken (e.g., pH, turbidity, temperature, conductivity, etc.), photographs, analyses, and incident reports. The EM will document any potential adverse effects to the environment and will include the nature of the effect, its cause, mitigation and/or remediation measures implemented, and whether a work stoppage was ordered. This will be used by the EM to complete and submit environmental monitoring reports to the Contractor, which will subsequently be submitted to VFPA's HEP.

### **3.3 HEP ENVIRONMENTAL MONITOR RESPONSIBILITIES (INDEPENDENT MONITOR)**

VFPA's HEP will also retain a QEP in the role of the Project Independent Monitor (IM) to provide auditing level environmental services for the Project. The IM will be responsible for:

- Reviewing the Contractor's EM reports.
- Conducting periodic spot checks of the Project site to verify compliance with this CEMP, the Contractor's EPP and applicable regulations, standards and BMPs. If deemed necessary for the protection of the environment, the IM will have the authority to issue stop work orders.
- Submitting reports to VFPA's HEP.

### 3.4 APPLICANT/CONTRACTOR RESPONSIBILITIES

The Contractor will be responsible for ensuring that the Project is undertaken in accordance with the conditions of the permits/approvals, this CEMP and the Contractor's EPP as well as any applicable federal, provincial and municipal regulations. The environmental responsibilities of the Contractor are identified below; however, specific items may be updated based on refinements to the construction methodology following selection of the Contractor and throughout construction.

- The Contractor will review conditions of the CEMP and their EPP with their field staff and sub-contractors prior to commencing work. The Contractor will be responsible for ensuring that their field staff and sub-contractors understand the BMPs for this Project and know how to properly install protection measures.
- The Contractor will comply with written or verbal instructions from the EM with respect to conducting activities in compliance with the mitigation measures outlined in this CEMP and Contractor's EPP, and per applicable regulations, standards and permits.
- The Contractor will correct deficiencies and any non-compliance issues upon direction from the EM whether written or verbal. Corrections should be made as soon as reasonably possible, ideally within 24 hours.

### 3.5 RELEVANT ENVIRONMENTAL PERMITS

Environmental permits, documents and/or exemptions that are anticipated to apply to the Project are highlighted in **Table 3**. Note that obtaining other construction-related permits (e.g., scientific fish collection permits) will be the responsibility of the Contractor conducting the works and these have not been accounted for in **Table 3**.

**Table 3 Main Permits, Documents, and/or Exemptions and Approvals Anticipated**

Name	Agency	Comments
Category C Project and Environmental Review Permit	Vancouver Fraser Port Authority	This CEMP is included as part of a formal application submission to VFPA. Note: As the Project is within VFPA's jurisdiction, it is not anticipated that Transport Canada will play a role in the navigation permitting process.
Centrum Expansion Project (CEP) <i>Fisheries Act</i> Authorization	Fisheries and Oceans Canada	VFPA is proposing to use a portion of MMRP as a fisheries habitat offsetting site for the proposed CEP. Conditions of the CEP <i>Fisheries Act</i> Authorization may include requirements applicable to the construction of MMRP.
Disposal at Sea Exemption for Beneficial Use	Environment and Climate Change Canada	The Project will be reviewed by the Disposal at Sea Program due to placement of material within their jurisdiction.



## **4.0 MITIGATION MEASURES AND ENVIRONMENTAL SPECIFICATIONS**

The following section outlines environmental standards, guidelines and BMPs applicable to the Project. Additional mitigation measures may also be outlined in the VFPA PER permit or may be provided by other regulatory agencies. These will be incorporated into the Contractor's EPP developed for the Project.

### **4.1 GENERAL PRACTICES - MARINE WORKS**

Marine construction-related activities may take place from marine-based barges, derricks and scows. Potential negative effects to aquatic resources during construction-related activities will be mitigated by implementing appropriate measures as outlined below.

- The majority of the construction work is scheduled to occur during the Burrard Inlet least-risk timing window (i.e., August 16<sup>th</sup> to February 28<sup>th</sup>). Any work outside the window would occur with appropriate mitigation in place.
- During severe weather conditions (e.g., >70 km/h winds), work may be suspended if the effectiveness of mitigation measures is reduced (e.g., silt curtain application during dredging activity).
- Barges and other vessels will not ground on the foreshore or seabed, or otherwise disturb the foreshore or seabed (including disturbance as a result of vessel propeller wash), excepting only such disturbance as is reasonably required resulting from the use of barge spuds and anchors.

### **4.2 SITE ACCESS, MOBILIZATION AND LAYDOWN AREAS**

Prior to construction, the method by which the Contractor plans to access the Project site and mobilize construction-related equipment will be clearly described. Any challenges for site access or mobilization will be identified. It is currently anticipated that construction equipment will need to mobilize to access the Maplewood Basin during high tidal conditions at commencement of construction. However, additional information including a drawing/figure showing access points and anchoring areas at the Project site, is anticipated to be incorporated into the Contractor's EPP. Mobilization will be planned to minimize the number of trips to and from the Project site.

### **4.3 SEDIMENT CONTROL AND MANAGEMENT**

The Contractor will not permit sediment, sediment-laden waters, or other deleterious substances to enter the water during the Project. As described below, the Contractor will carry out all physical activities in a manner that prevents induced sedimentation and induced turbidity of local waters, and the release of sediment, sediment-laden waters, and turbid waters to the aquatic environment.

- Appropriate dredging equipment will be selected and operated in a manner that reduces spillage.

- The direct or indirect release or deposit of sediment or sediment-laden water into the aquatic environment outside the active work area (e.g., outside any silt curtains used for the Project), will be minimized during the works. In this regard, reference will be made to the water quality criteria described in the British Columbia Water Quality Guidelines (MOE 2018).
- Rock and fill materials (i.e., sand/silt) used for the Project will be demonstrated to be clean and free of environmental contamination.<sup>2</sup>
- The placement of rock and fill material will occur in a controlled manner to limit generation of suspended sediment and increased turbidity.
- While it is anticipated that dredged and placed sand will settle out of suspension relatively quickly due to the high settling velocity of sand and the relatively low velocity of waters at the Project site (AECOM 2018), it is anticipated that silt curtains will be used (e.g., Type III silt curtains that are designed to withstand current velocities of up to 1.5 m/s (AECOM 2018)). Silt curtains will be used, where technically feasible, to limit the release of turbid waters during dredging of the Southwest Channel and placement of fill in the Northeast Basin.

#### **4.4 MACHINERY AND EQUIPMENT**

For machinery and equipment working on the Project site, the Contractor will ensure that:

- All machines and equipment are in good operating condition and meet applicable requirements for serviceability and exhaust emissions. Equipment will be free of leaks, excess oil and grease.
- Equipment is cleaned off, and visually inspected for, invasive species and noxious weeds prior to arriving on, and leaving, the Project site.
- Daily inspections are undertaken for all equipment used on the job.
- Equipment used around water is equipped with biodegradable hydraulic fluid, as is practical.
- Equipment maintenance occurs off-site, where and when possible. If equipment maintenance is required on-site, activities will be undertaken overtop an impermeable layer.
- No equipment is washed within the Project area or near open water.
- Equipment is operated at optimum rated loads and is turned off when not in use to minimize exhaust and noise emissions. Equipment producing excessive exhaust or noise will be repaired or replaced.
- Refueling of equipment occurs in a contained area as far away from the water as possible. Funnels and drip trays will be used to control on-ground spillage of fuel. The refueling area will have a spill containment kit immediately accessible and personnel will be knowledgeable in the use of the kit.

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<sup>2</sup> Physical and chemical characterization of the potential Source Sites (Southwest Channel and Fraser River sands) and the Receiving Site (Northeast Basin) sediments was completed by Hemmera in 2018. The analyses indicated that sediment from the Source Sites is of better quality than the Receiving Site, and placement of material from the Source Sites is not likely to degrade the receiving environment since the concentrations of potential contaminants of concern appear to be less than the Receiving Site sediments (Hemmera 2018b).

#### **4.5 AIR QUALITY**

The Project will be undertaken from water by barge. Upland activities (e.g., excavation with potential to result in dust generation and/or track out of vehicles) are not anticipated. However, air emissions such as equipment exhaust and vapours associated with marine construction-related activities will be minimized and managed to avoid adverse health, safety, nuisance and other environmental effects on- and off-site. The following standard BMPs for air quality will be applied for machinery working on the Project site:

- All equipment, vehicles and stationary emission sources will be well-maintained and used at optimal loads to minimize emissions.
- Vehicles or equipment producing excessive exhaust will be repaired or replaced prior to being used on the Project.
- Once a diesel engine/generator has reached its operating temperature, the engine will not be left idling when no work is required.
- Stationary emission sources (e.g., portable diesel generators, compressors, etc.) will be used only as necessary and turned off when not in use.
- Equipment and vehicles will be turned off when not in active use.

#### **4.6 NOISE**

Work is anticipated to occur outside VFPA's standard regular working hours (i.e., Monday to Saturday between 7:00 am and 8:00 pm, excluding holidays). The affected surrounding community will be notified (as appropriate) of the nature and duration of noisy operations in advance of work taking place and/or when work is required outside regular working hours.

Noise generation and vibrations resulting from equipment and associated activities during construction will be addressed through appropriate noise management practices. The following BMPs will be implemented to minimize noise generation:

- All equipment will be properly maintained to limit noise emissions and fitted with functioning exhaust and muffler systems. Machine covers and equipment panels will be well-fitted and will remain in place to muffle noise. Bolts and fasteners will be tight to avoid rattling.
- Engines will be turned off when not in use.

#### **4.7 AQUATIC SPECIES AND HABITAT**

Aquatic species such as fish, marine mammals and marine invertebrates have potential to be encountered and/or affected by Project works.

- To minimize the risk of direct or indirect effects on fisheries species, the heavy construction work (dredging activities and placement of materials) will take place during the applicable annual least-

risk timing window (i.e., August 16<sup>th</sup> to February 28<sup>th</sup>), where possible. However, due to the potential material settlement time required for sediment placement in the Northeast Basin, material placement may extend beyond the end of the least-risk timing window (e.g., post-February 28<sup>th</sup>). Any work outside the window would occur with appropriate mitigation in place.

- In the Northeast Basin, a pre-construction dive survey will be conducted in advance of fill placement to inform the appropriate level of mitigation and salvage effort required (e.g., to assess the density of crabs in the fill area). An aquatic life salvage (e.g., for crabs with the use of perimeter crab traps) may subsequently be conducted in the Northeast Basin prior to the placement of rock and fill materials. Salvaged organisms will be relocated to similar habitat outside the Northeast Basin.
- In advance of dredging of the Southwest Channel a salvage of marine organisms will be undertaken either during a low tide and/or during high tide via divers. Salvaged marine organisms will be relocated to nearby appropriate habitats not affected by construction.
- Species to be targeted with salvage efforts in the Northeast Basin and Southwest Channel will be CRA invertebrate species that may be present within the Project area including, but not necessarily limited to, Dungeness crab (*Metacarcinus magister*), red rock crab (*Cancer productus*), California sea cucumber (*Parastichopus californicus*) and urchins (*Strongylocentrotus* spp.). Fin fish will not be targeted by the salvage as they are likely to move out of the work area as construction activities begin.
- Sensitive marine habitats (e.g., existing nearby kelp and eelgrass communities) will be appropriately marked (e.g., with buoys), georeferenced, and avoided during in-water works.
- Slow commencement of in-water construction activities is recommended to encourage mobile aquatic species to leave the construction area.
- Mitigation measures as outlined in the sections above (e.g., in relation to noise, sediment control and machinery/equipment) will be implemented to minimize negative effects to aquatic species and their habitat.
- Marine mammal safety zones will be established around the Project site, including a 1,000 m safety zone for cetaceans (whales, dolphins, and porpoises) and a 150 m safety zone for pinnipeds (seals and sea lions). If a marine mammal enters its respective safety zone during in-water construction activities, a work stoppage will be implemented if the marine mammal is at risk of physical harm or is observed to be disturbed by construction activities. Construction activities may only resume once the marine mammal has been confirmed to have left the safety zone or has not been sighted for 30 minutes. While it is not anticipated that construction activities will result in noise levels that exceed the acoustics thresholds of fish and marine mammals (i.e., no pile driving is proposed as part of the Project), if activities are anticipated to result in the generation of loud underwater noises, a marine mammal observer will be required to monitor the noisy work and implement an underwater noise monitoring program.

- Dependent on the specific construction methodology proposed, additional mitigation measures will be incorporated into the Contractor's EPP, as appropriate.

#### **4.8 TERRESTRIAL VEGETATION AND WILDLIFE MANAGEMENT**

Terrestrial vegetation is not anticipated to be affected as a result of the Project. In general, Project-related effects to local terrestrial wildlife surrounding the Project areas are anticipated to be minimal and are primarily limited to possible interactions with bird species that may use the Project area for foraging and/or the surrounding area for nesting purposes. As such, negative construction-related effects to terrestrial species will generally be limited to noise disturbance (see **Section 4.6**). To avoid attracting wildlife to the Project site, an effective garbage management system will be implemented during construction.

The majority of work is anticipated to occur during the fisheries least-risk timing window, outside of the general nesting bird window. However, should construction activities extend into the general nesting period of migratory birds in the region, extra precaution will be exercised to avoid causing harm to birds and/or their active nests and eggs.

A known osprey nest (protected under the BC *Wildlife Act* (s.34b)) is located on a piling approximately 130 m southeast of the Northeast Basin. Due to the sensitivity of the Project being located adjacent to a conservation area, it is recommended that a 100 m buffer plus 1.5 tree lengths (conservatively considered 20 m for this osprey nest on a marine pile) be implemented during Project construction as a best management practice. Land contouring, dredging, construction, or any other unusual or sudden loud activity will not be conducted within this 120 m buffer during the osprey breeding window (i.e., March 21 to September 5). This is in accordance with *Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia* (MOE 2013).

#### **4.9 ARCHAEOLOGICAL RESOURCES**

A recorded archaeological site (a fishweir) is situated in the existing intertidal flats immediately southeast of the Northeast Basin. To mitigate potential effects to this archaeological resource during habitat enhancement initiatives in the Northeast Basin, a 25 m buffer (archaeological site work avoidance zone) will be implemented around the archaeological site. Crews will be briefed on the location of this work avoidance zone (ILP 2018).

If the Contractor encounters, or expects to encounter an actual or potential archaeological resource during construction activities, they will implement a Chance Find Procedure in alignment with the following:

- Immediately stop any activities that might disturb the archaeological resource or the site in which it is contained.
- Not move or otherwise disturb the artifacts or other remains present at the site.
- Mark the location of the site to prevent additional disturbances.
- Immediately notify VFPA by email and phone.

#### **4.10 NAVIGATION**

To avoid conflict with other vessels and water users, the following BMPs will be implemented:

- Prior to the commencement of any vessel-related activities, the appropriate Canadian Coast Guard and Marine Communication and Traffic Services centre will be notified regarding the issuance of a Notice to Shipping to advise the marine community of potential hazards associated with the Project.
- At least two days prior to commencing any construction or physical activities, the Harbour Master and VFPA Environmental Programs will be notified.
- All vessels and equipment will be positioned in a manner that does not obstruct the line of sight to navigational aids or markers.
- All vessels will exhibit appropriate lights and day shapes at all times.
- The Contractor will monitor the Very High Frequency (VHF) channel used for Marine Communications and Traffic Services in the respective area at all times and participate as necessary.
- The Contractor will be familiar with vessel movements in areas affected by the Project.
- The Project activities will not impede navigation or interfere with vessel operations.
- During night hours, equipment will be moored outside the navigation channel and lit in accordance with all applicable regulations.

## 5.0 FUEL MANAGEMENT PLAN

The Contractor's EPP will identify areas for equipment re-fueling and show this on a site plan. The fuel management plan will provide a bulleted list of measures being incorporated during construction to ensure the receiving environment is adequately protected from construction-related fuels and products on the Project site. The following BMPs will be used for fuel management:

- Adequate spill containment materials will be within refueling areas at all time.
- Bulk fuel will not be stored within the Project area to prevent the possibility of leaks or contamination.
- Where feasible, pre-fueling of equipment will occur prior to arrival within the Project area to reduce the potential for spills and leaks.
- For refueling of skiffs and other mobile equipment, the following refueling procedures will be implemented:
  - Make sure the vessel is secure.
  - Measure the quantity that is required, to be able to anticipate when the tank is nearly full.
  - Never leave the area unattended while refueling.
- Where possible, one area will be designated for fuel transfer (e.g., a flat area that minimizes potential for fuel spills to enter the marine environment).
- Fuel, oil, chemicals and other hazardous materials will be placed in a lockable enclosure of sufficient volume to contain a spill.
- Refueling equipment and tanks will be clean and in good working order. Fuel tanks should be situated within appropriate secondary containment (an impermeable containment facility capable of holding 110% of the storage tank contents). This may be achieved through the use of double-walled storage tanks or sit-in containers constructed out of impermeable material, such as aluminum or plastic.
- If transferring fuel from a mobile tank to large machines, sorbent material will be placed around the fuel inlet prior to dispensing. Pumping equipment with an approved hose and top-fill nozzle will be used and a proper connection between the fuel source and machine will be verified. The fill valve will be open while transferring fuel.
- Receiving tanks will not be overfilled.
- Smaller equipment will be placed in portable secondary containment and refuelled using approved jerry cans.
- Any transportation of dangerous goods (i.e., fuel and lubricating oils) for construction equipment, will be carried out in conformity with the federal *Transportation of Dangerous Goods Act*.



## 6.0 WASTE MANAGEMENT

Minimal construction waste is anticipated to be generated based on the nature of the Project. However, the Contractor will maximize opportunities to reduce, reuse and recycle waste materials generated on the Project site. All debris and waste material will be collected in the immediate working area within the Project site. Waste material will be disposed at suitable upland locations. Contractors will adhere to all applicable legislation with respect to the handling, transportation, and/or disposal of all materials related to this Project (waste or otherwise). These regulations may include (but not be limited to) the BC Hazardous Waste Regulations, Spill Reporting Regulations, Workers Compensation Board Regulations, Transportation of Dangerous Goods Regulations, etc. The following BMPs will be implemented with respect to waste management:

- Clean up of barges will be an ongoing maintenance activity.
- Any debris that is inadvertently lost overboard and deposited (floating or sinking) within the marine environment will be recovered as soon as possible.
- Hazardous wastes generated could include waste petroleum products (e.g., engine oils and lubricants) from machinery and equipment, spent batteries, solvents and cleaning agents, etc. Contractors will provide labelled separate containers for potentially hazardous waste such as oily rags and hydrocarbon absorbent pads.
- All hydrocarbon products and other hazardous wastes potentially present during construction will be identified. The associated Workplace Hazardous Materials Information System and Materials Safety Data Sheets of these products will be made available to all construction team members.
- All recyclable or compostable materials will be collected separately from general waste as per Metro Vancouver Regional District requirements.

## 7.0 EMERGENCY RESPONSE

An integral part of effective environmental management during construction-related activities is a comprehensive emergency response plan, which when initiated, allows for the rapid response of emergency services and/or the containment and cleanup of environmental emergencies. The following section provides a general outline for an effective response plan. The Contractor will be responsible for ensuring a specific response plan is incorporated into their EPP.

### 7.1 EMERGENCY COMMUNICATION

The Contractor's EPP will include a communication plan, including contact information for all parties who are responsible for the Project, or are critical to the response or reporting of accidents or environmental emergencies such as spills of oil, fuel or chemicals to a receiving waterbody. VFPA, Environment and Climate Change Canada, Fisheries and Oceans Canada and the Provincial Emergency Management BC Program (formerly the Provincial Emergency Program) are to be notified of reportable incidents. Below is an example contact table (**Table 4**).

**Table 4 Emergency Contact Numbers**

Agency	Phone Number
Emergency Services	911
VFPA Operations Centre	605-665-9086
Local Non-Emergency Police	604-985-1311
Local Non-Emergency Fire	604-990-3682
Lions Gate Hospital (231 15 <sup>th</sup> Street East, North Vancouver)	604-988-3131
Vancouver General Hospital (899 W 12 <sup>th</sup> Avenue, Vancouver)	604-875-4111
BC Emergency Spill Reporting Line	1-800-663-3456
Canadian Coast Guard	1-800-889-8852 (Marine Pollution)
	1-250-363-6333 (Navigation Hazard)
	1-800-567-5111 (Search and Rescue)

## 7.2 SPILL RESPONSE PLAN

Prior to commencement, the Contractor's EPP will establish an appropriate spill prevention, containment and clean-up plan for hydrocarbon products (including fuel, oil, and hydraulic fluid) and any other deleterious substances using standards, practices, methods and procedures to a good commercial standard. The Contractor will ensure that appropriate spill containment and clean-up supplies are available at the Project site at all times, and that all personnel working on the Project are familiar with the spill prevention, containment and clean-up plan.

The EPP developed by the Contractor will include measures to be implemented as part of the spill response plan such as:

- Identification of any/all hazardous materials/products as well as waste storage and secondary containment. Materials Safety Data Sheets will be kept at the Project site and made available to all construction team members.
- Identification of the locations of spill response equipment and materials for containment and clean-up (spill kits and contents) as well as instruction on how to use them effectively. Locations of product/material storage and spill kits should be readily identified on a figure or map and posted in an appropriate location at the Project site.

The following represents the minimum scope for spill response/management procedures:

- Assess safety – ensure unnecessary people are kept clear of the area and that people with proper training and equipment deal with the spill. Put on any required personal protective equipment and consult Material Safety Data Sheets.
- Stop the source – if required, and when it is safe to do so, stop the spill at its source. This may simply be righting an overturned container or sealing a hole.
- Contain and control the spill – the spill should be prevented from infiltrating into the ground or entering a waterbody. If the spill occurs on water, booms should be immediately deployed to prevent its spread.
- Clean up the spill – utilize appropriate absorbent pads or other materials based on the type of substance spilled. The method of disposing of the waste is dependent on the amount and type of deleterious substance that was spilled.
- Notify appropriate authorities – spills of a reportable quantity will be reported to the appropriate agencies. Minor spills will be reported to the EM.
- Record the incident – make a note of what, how and where the incident happened as well as what was done to clean it up. Depending on the spill, further assessment of the effect to land and water and/or additional cleanup may be required.

When reporting a spill, the caller will provide the dispatcher with the following information, as accurately as possible:

- Name and contact phone number of the person initiating the call;
- Name and telephone number of the person who caused the spill;
- Location and time of the spill;
- Type and quantity of the substance spilled;
- Cause and effect of the spill;
- Details of action taken or proposed;
- Description of the spill location and surrounding area;
- Names of agencies/responders on scene; and
- Names of other persons or agencies advised or to be advised concerning the spill.

## 8.0 REFERENCES

AECOM. 2018. Maplewood Marine Restoration Project: Habitat Design – 60% Design Report. Prepared for the Vancouver Fraser Port Authority.

Balanced Environmental Services Inc. (Balanced). 2017. Biophysical Survey: Maplewood Flats, North Vancouver, British Columbia. Prepared for AECOM.

Hemmera Envirochem Inc. (Hemmera). 2018a. Existing Ecological Conditions: Maplewood Marine Restoration Project. Prepared for Vancouver Fraser Port Authority.

Hemmera Envirochem Inc. (Hemmera). 2018b. Maplewood Marine Restoration Project Sediment Characterization. Prepared for Vancouver Fraser Port Authority.

Inlailawatash Limited Partnership (ILP). 2018. Maplewood Marine Restoration Project: Archaeological Overview Assessment. Prepared for Vancouver Fraser Port Authority.

Ministry of Environment (MOE). 2013. Guidelines for Raptor Conservation During Urban and Rural Land Development in British Columbia. Best Management Practices, B.C. Ministry of Environment. <[http://www.env.gov.bc.ca/wld/documents/bmp/raptor\\_conservation\\_guidelines\\_2013.pdf](http://www.env.gov.bc.ca/wld/documents/bmp/raptor_conservation_guidelines_2013.pdf)>. Accessed 15 Aug 2013.

MOE. 2018. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture: Summary Report. Water Protection & Sustainability Branch, Ministry of Environment & Climate Change Strategy. Accessed May 2018 <[https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/wqgs-wqos/approved-wqgs/wqg\\_summary\\_aquaticlife\\_wildlife\\_agri.pdf](https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/wqgs-wqos/approved-wqgs/wqg_summary_aquaticlife_wildlife_agri.pdf)>.

Port Metro Vancouver. 2015. Project and Environmental Review Guidelines – Construction Environmental Management Plan (CEMP). Accessed April 2018 <<https://www.portvancouver.com/wp-content/uploads/2015/10/PER-Construction-Environmental-Management-Plan-CEMP-Guidelines-FINAL-2015-10-16.pdf>>.

## Nutton, Byron

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**From:** Stockley, Melanie  
**Sent:** 2019–March-11 3:09 PM  
**To:** McOuat, Chris; PACAssets / PACActifs (DFO/MPO)  
**Cc:** Nutton, Byron  
**Subject:** Completed Vehicle Business Cases for FFHPP  
**Attachments:** Attached Image; Attached Image; Attached Image; Attached Image  
  
**Importance:** High

Hi Chris,

Please see the attached business cases for the two replacement and two new vehicles for FFHPP. They have been signed by Brad Fanos (Director, FFHPP) and Cheryl Webb (Regional Director, EMB).

Thank you very much for all of your help with these!

### Melanie Stockley

Team Lead / Fisheries Protection Program  
Ecosystems Management Branch  
Fisheries and Oceans Canada  
[melanie.stockley@dfo-mpo.gc.ca](mailto:melanie.stockley@dfo-mpo.gc.ca) | 604-666-2874

Chef d'équipe / Programme de la protection des pêches  
Direction des écosystèmes  
Pêches et Océans Canada  
[melanie.stockley@dfo-mpo.gc.ca](mailto:melanie.stockley@dfo-mpo.gc.ca) | 604-666-2874

## Nutton, Byron

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**From:** dfo.donotreply-nepasrepondre.mpo@canada.ca  
**Sent:** 2019–March-11 4:01 PM  
**To:** Stockley, Melanie  
**Subject:** Attached Image  
**Attachments:** 1265\_001.pdf





## Motor Vehicle Business Case – Long Form

Please complete all sections and fill in shaded areas where applicable.

<b>A. General Information</b>			
Date (dd-mmm-yy)	28 Feb 2019	Region	Pacific
Requestor's name	Brad Fanos	Sector	Ecosystems Management Branch
RC – Business Line	5B540 310	Program	Fisheries Protection Program
<b>B. Reason For Request – Check one of the following ✓</b>			
<input checked="" type="checkbox"/> Additional vehicle (increases Fleet size)-Skip to Section E Upgraded vehicle (Cost, Emissions, or Specification Code) <input type="checkbox"/> Medium/Heavy Duty vehicle (Spec. Codes U, V, W, X, Y ONLY)		<input type="checkbox"/> Early replacement (includes accidents/repairs with Spec. change) <input type="checkbox"/> Aftermarket additional options required (excluding CCG red) Other _____	
<b>C. Current Vehicle (if applicable)</b>			
Vehicle TAG Number		GMVOG Specification code	
Make		Current Odometer (km)	
Model		Life-To-Date Maintenance Costs (\$)	
Year		12 Month Maintenance Costs (\$)	
Fuel Type		Repair Estimate (\$)	
Colour		Towing capacity (lbs.)	
Condition		Payload capacity (lbs.)	
Special Equipment (if any) and other options			
<b>D. DVAP Recommended Vehicle (if applicable)</b>			
Make		GMVOG Specification code	
Model		Forecasted Purchase Cost (\$)	
Fuel Type		Box Length (ft.)	
# of Passengers		Towing capacity (lbs.)	
Engine Size (L)		Payload capacity (lbs.)	
<b>E. Requirements for Proposed Vehicle (if applicable)</b>			
Date Required (dd-mmm-yy)		GMVOG Spec. Code (i.e. Q81)	<b>L41</b>
Make	<b>Nissan</b>	Forecasted DISO # (i.e. 110)	<b>57</b>
Model	<b>Rogue</b>	Base Vehicle Cost (\$)	<b>\$23,310.00</b>
Fuel Type	<b>Gas</b>	Additional Option Costs (\$)	
# of Passengers	<b>4</b>	Box Length (ft.) & Box Cap (Y/N)	
Engine Size (L)	<b>2.5</b>	Colour (Standard = White)	
Forecasted Use : Km/Year	<b>30,000</b>	Towing capacity (lbs.)	
Towing Frequency/month	<b>nil</b>	Payload capacity (lbs.)	
Special Equipment (if any) and other options	All-wheel drive		
<b>F. Identify Other Alternatives to Avoid This Request</b> Ex. pooled vehicle, outsource function, or borrow from other			

## Motor Vehicle Business Case – Long Form

program. Use attachments to provide more detail if required.			
n/a			
<b>G. Provide a justification for your request (with details of the situation).</b>			
<p>The rationale for a new vehicle is FPP's expected substantial program expansion (as many as 40 new positions). The rationale for the type of vehicle is that we still need the ability to get through the city and take several people (for meetings and such), but also with the flexibility to accommodate field gear and attend sites visits in somewhat out of the way places on light gravel roads or winter driving conditions.</p>			
<b>H. Funding Source(s)</b>			
Financial Coding	5B540 310 280 lobj 50001	Amount Funded (\$)	
<b>I. Recommendations and Approval</b>			<b>Indicate with a ✓</b>
<b>1. Responsibility Centre Manager (RCM) / Custodian</b> completes all previous sections of the template, <u>documents justification for the requirement</u> , and forwards the Business Case to the Director/Regional Director (2).			
Signature		Position Title	DIRECTOR, FPP
Print Name		Date (dd-mmm-yy)	MAR 11 2019
<b>2. Director/Regional Director (RD)</b> reviews, analyzes, and indicates if he/she supports or rejects the Business Case. If supported, forwards to the Regional Manager, MPS (5). <b>Exception:</b> for the CCG add AC (3) approval, then forward to Regional Manager, MPS (5). If rejected, provides short justification to RCM (1) and informs Regional Manager, MPS (5).			
Signature		<input checked="" type="checkbox"/> Supports Business Case	<input type="checkbox"/> Rejects Business Case
Print Name	Cheryl Webb, RD EMB	Justification/Comments:	
Date (dd-mmm-yy)	MAR 11 2019		
<b>3. Assistant Commissioner (AC)</b> reviews the Business Case, analysis & recommendations, determines if supported or not, provides short rationale, notifies IBMS HQ Capital Investment Group and returns documentation the Director/RD (2).			
Signature		<input type="checkbox"/> Supports Business Case	<input type="checkbox"/> Rejects Business Case
Print Name		Rationale/Comments:	
Date (dd-mmm-yy)			
<b>4. Regional Vehicle Fleet Manager (RVFM)</b> reviews the Business Case and <u>prepares an independent written analysis</u> identifying risk, possible alternatives & recommendations for the Dept. or Region, returns to the Regional Manager, MPS (5).			
Signature		Independent Analysis of submission attached x	
Print Name	Chris McOuat	Date (dd-mmm-yy)	
<b>5. Regional Manager, Materiel and Procurement Services (MPS)</b> reviews the Business Case and RVFM's written analysis, indicates if supported or not, provides comments and forwards documentation to the RDG (6). Upon return from the RDG (6), forwards to Senior Manager, MPS Operations for submission to the Director, MPS (7).			
Signature		<input type="checkbox"/> Supports Business Case	<input type="checkbox"/> Unsupportive of Business Case
Print Name		Comments:	
Date (dd-mmm-yy)			
<b>6. Regional Director General (RDG)</b> reviews the Business Case, analysis & recommendations, determines if supported or not, provides short rationale, and returns documentation to the Regional Manager, MPS (5).			
Signature		<input type="checkbox"/> Supports Business Case & recommends to CFO	<input type="checkbox"/> Rejects Business Case
Print Name		Rationale/Comments:	
Date (dd-mmm-yy)			

## Motor Vehicle Business Case – Long Form

**7. Director, MPS** conducts a review of the Business Case, prepares a recommendation to the CFO and forwards the Business Case and recommendation to the CFO (8).

Signature		<input type="checkbox"/> Recommendation attached	
Print Name		<input type="checkbox"/> Recommends Business Case	<input type="checkbox"/> Unsupportive of Business Case
Date (dd-mmm-yy)			

### J. Final Decision

**8. Chief Financial Officer (CFO)** reviews and analyzes the Business Case, accompanying analysis and recommendations. A decision is taken to approve or reject the Business Case.

Signature		<input type="checkbox"/> Business Case Approved	<input type="checkbox"/> Rejects Business Case
Print Name		Rationale/Comments:	
Date (dd-mmm-yy)			

Record of Decision

<b>Decision entered</b> into the DVAP (by whom and date (dd-mmm-yy))	
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## Nutton, Byron

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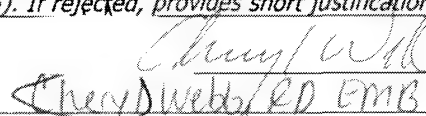
**From:** dfo.donotreply-nepasrepondre.mpo@canada.ca  
**Sent:** 2019-March-11 4:01 PM  
**To:** Stockley, Melanie  
**Subject:** Attached Image  
**Attachments:** 1264\_001.pdf

# Motor Vehicle Business Case – Long Form

Please complete all sections and fill in shaded areas where applicable.

<b>A. General Information</b>			
Date (dd-mmm-yy)	28 Feb 2019	Region	Pacific
Requestor's name	Brad Fanos	Sector	Ecosystems Management Branch
RC – Business Line	5B540 310	Program	Fisheries Protection Program
<b>B. Reason For Request – Check one of the following ✓</b>			
<input checked="" type="checkbox"/> Additional vehicle (increases Fleet size)-Skip to Section E Upgraded vehicle (Cost, Emissions, or Specification Code) <input type="checkbox"/> Medium/Heavy Duty vehicle (Spec. Codes U, V, W, X, Y ONLY)		<input type="checkbox"/> Early replacement (includes accidents/repairs with Spec. change) <input type="checkbox"/> Aftermarket additional options required (excluding CCG red) Other _____	
<b>C. Current Vehicle (if applicable)</b>			
Vehicle TAG Number		GMVOG Specification code	
Make		Current Odometer (km)	
Model		Life-To-Date Maintenance Costs (\$)	
Year		12 Month Maintenance Costs (\$)	
Fuel Type		Repair Estimate (\$)	
Colour		Towing capacity (lbs.)	
Condition		Payload capacity (lbs.)	
Special Equipment (if any) and other options			
<b>D. DVAP Recommended Vehicle (if applicable)</b>			
Make		GMVOG Specification code	
Model		Forecasted Purchase Cost (\$)	
Fuel Type		Box Length (ft.)	
# of Passengers		Towing capacity (lbs.)	
Engine Size (L)		Payload capacity (lbs.)	
<b>E. Requirements for Proposed Vehicle (if applicable)</b>			
Date Required (dd-mmm-yy)		GMVOG Spec. Code (i.e. Q81)	<b>L41</b>
Make	<b>Nissan</b>	Forecasted DISO # (i.e. 110)	<b>57</b>
Model	<b>Rogue</b>	Base Vehicle Cost (\$)	<b>\$23,313.00</b>
Fuel Type	<b>Gas</b>	Additional Option Costs (\$)	
# of Passengers	<b>5</b>	Box Length (ft.) & Box Cap (Y/N)	
Engine Size (L)	<b>2.5</b>	Colour (Standard = White)	
Forecasted Use : Km/Year	<b>30,000</b>	Towing capacity (lbs.)	
Towing Frequency/month	<b>nil</b>	Payload capacity (lbs.)	
Special Equipment (if any) and other options	All-wheel drive		
<b>F. Identify Other Alternatives to Avoid This Request</b> Ex. pooled vehicle, outsource function, or borrow from other			

## Motor Vehicle Business Case – Long Form

program. Use attachments to provide more detail if required.			
n/a			
<b>G. Provide a justification for your request</b> (with details of the situation).			
<p>The rationale for a new vehicle is FPP's expected substantial program expansion (as many as 40 new positions). The rationale for the type of vehicle is that we still need the ability to get through the city and take several people (for meetings and such), but also with the flexibility to accommodate field gear and attend sites visits in somewhat out of the way places on light gravel roads or winter driving conditions.</p>			
<b>H. Funding Source(s)</b>			
Financial Coding	5B540 310 280 lobj 50001	Amount Funded (\$)	
<b>I. Recommendations and Approval</b>			<b>Indicate with a v</b>
<b>1. Responsibility Centre Manager (RCM) / Custodian</b> completes all previous sections of the template, <u>documents justification for the requirement</u> , and forwards the Business Case to the Director/Regional Director (2).			
Signature		Position Title	DIRECTOR, FHPD
Print Name		Date (dd-mmm-yy)	MAR 11 2019
<b>2. Director/Regional Director (RD)</b> reviews, analyzes, and indicates if he/she supports or rejects the Business Case. If supported, forwards to the Regional Manager, MPS (5). <b>Exception:</b> for the CCG add AC (3) approval, then forward to Regional Manager, MPS (5). If rejected, provides short justification to RCM (1) and informs Regional Manager, MPS (5).			
Signature		<input checked="" type="checkbox"/> Supports Business Case	<input type="checkbox"/> Rejects Business Case
Print Name	Cheryl Webb, RD EMB	Justification/Comments:	
Date (dd-mmm-yy)	MAR 11 2019		
<b>3. Assistant Commissioner (AC)</b> reviews the Business Case, analysis & recommendations, determines if supported or not, provides short rationale, notifies IBMS HQ Capital Investment Group and returns documentation the Director/RD (2).			
Signature		<input type="checkbox"/> Supports Business Case	<input type="checkbox"/> Rejects Business Case
Print Name		Rationale/Comments:	
Date (dd-mmm-yy)			
<b>4. Regional Vehicle Fleet Manager (RVFM)</b> reviews the Business Case and <u>prepares an independent written analysis</u> identifying risk, possible alternatives & recommendations for the Dept. or Region, returns to the Regional Manager, MPS (5).			
Signature		Independent Analysis of submission attached x	
Print Name	Chris McOuat	Date (dd-mmm-yy)	
<b>5. Regional Manager, Materiel and Procurement Services (MPS)</b> reviews the Business Case and RVFM's written analysis, indicates if supported or not, provides comments and forwards documentation to the RDG (6). Upon return from the RDG (6), forwards to Senior Manager, MPS Operations for submission to the Director, MPS (7).			
Signature		<input type="checkbox"/> Supports Business Case	<input type="checkbox"/> Unsupportive of Business Case
Print Name		Comments:	
Date (dd-mmm-yy)			
<b>6. Regional Director General (RDG)</b> reviews the Business Case, analysis & recommendations, determines if supported or not, provides short rationale, and returns documentation to the Regional Manager, MPS (5).			
Signature		<input type="checkbox"/> Supports Business Case & recommends to CFO	<input type="checkbox"/> Rejects Business Case
Print Name		Rationale/Comments:	
Date (dd-mmm-yy)			



## Motor Vehicle Business Case – Long Form

**7. Director, MPS** conducts a review of the Business Case, prepares a recommendation to the CFO and forwards the Business Case and recommendation to the CFO (8).

Signature		<input type="checkbox"/> Recommendation attached	
Print Name		<input type="checkbox"/> Recommends Business Case	<input type="checkbox"/> Unsupportive of Business Case
Date (dd-mmm-yy)			

### J. Final Decision

**8. Chief Financial Officer (CFO)** reviews and analyzes the Business Case, accompanying analysis and recommendations. A decision is taken to approve or reject the Business Case.

Signature		<input type="checkbox"/> Business Case Approved	<input type="checkbox"/> Rejects Business Case
Print Name		Rationale/Comments:	
Date (dd-mmm-yy)			

Record of Decision

<b>Decision entered</b> into the DVAP (by whom and date (dd-mmm-yy))	
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## **Nutton, Byron**

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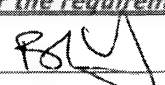
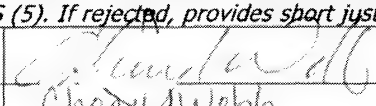
**From:** dfo.donotreply-nepasrepondre.mpo@canada.ca  
**Sent:** 2019–March-11 4:00 PM  
**To:** Stockley, Melanie  
**Subject:** Attached Image  
**Attachments:** 1263\_001.pdf

# Motor Vehicle Business Case – Long Form

Please complete all sections and fill in shaded areas where applicable.

<b>A. General Information</b>			
Date (dd-mmm-yy)	28 Feb 2019	Region	Pacific
Requestor's name	Brad Fanos	Sector	Ecosystems Management Branch
RC – Business Line	5B540 310	Program	Fisheries Protection Program
<b>B. Reason For Request – Check one of the following ✓</b>			
Additional vehicle (increases Fleet size)-Skip to Section E		<input type="checkbox"/> Early replacement (includes accidents/repairs with Spec. change)	
<input checked="" type="checkbox"/> Upgraded vehicle (Cost, Emissions, or Specification Code)		<input type="checkbox"/> Aftermarket additional options required (excluding CCG red)	
<input type="checkbox"/> Medium/Heavy Duty vehicle (Spec. Codes U, V, W, X, Y ONLY)		Other _____	
<b>C. Current Vehicle (if applicable)</b>			
Vehicle TAG Number	05-849	GMVOG Specification code	<b>D00</b>
Make	Ford	Current Odometer (km)	<b>69836</b>
Model	Taurus	Life-To-Date Maintenance Costs (\$)	\$3,465.32
Year	2002	12 Month Maintenance Costs (\$)	\$376.88
Fuel Type	Gas	Repair Estimate (\$)	
Colour	Grey	Towing capacity (lbs.)	
Condition		Payload capacity (lbs.)	
Special Equipment (if any) and other options			
<b>D. DVAP Recommended Vehicle (if applicable)</b>			
Make	Chevrolet	GMVOG Specification code	<b>D00</b>
Model	Malibu	Forecasted Purchase Cost (\$)	<b>\$23,313.00</b>
Fuel Type	<b>G</b>	Box Length (ft.)	
# of Passengers	5	Towing capacity (lbs.)	
Engine Size (L)		Payload capacity (lbs.)	
<b>E. Requirements for Proposed Vehicle (if applicable)</b>			
Date Required (dd-mmm-yy)		GMVOG Spec. Code (i.e. Q81)	<b>L41</b>
Make	<b>Nissan</b>	Forecasted DISO # (i.e. 110)	<b>57</b>
Model	<b>Rogue</b>	Base Vehicle Cost (\$)	
Fuel Type	<b>Gas</b>	Additional Option Costs (\$)	
# of Passengers	<b>5</b>	Box Length (ft.) & Box Cap (Y/N)	
Engine Size (L)	<b>2.5</b>	Colour (Standard = White)	
Forecasted Use : Km/Year	<b>30,000</b>	Towing capacity (lbs.)	
Towing Frequency/month	<b>nil</b>	Payload capacity (lbs.)	
Special Equipment (if any) and other options	All wheel drive		
<b>F. Identify Other Alternatives to Avoid This Request</b> Ex. pooled vehicle, outsource function, or borrow from other			

## Motor Vehicle Business Case – Long Form

program. Use attachments to provide more detail if required.			
n/a			
<b>G. Provide a justification for your request</b> (with details of the situation).			
The rationale for the change in type of vehicle is that we still need the ability to get through the city and take several people (for meetings and such), but also with the flexibility to accommodate field gear and attend sites visits in somewhat out of the way places with minor gravel road driving and all-wheel drive for safety in winter driving conditions.			
<b>H. Funding Source(s)</b>			
Financial Coding	5B540 310 280 lobj 50001	Amount Funded (\$)	
<b>I. Recommendations and Approval</b>		<b>Indicate with a ✓</b>	
1. <b>Responsibility Centre Manager (RCM) / Custodian</b> completes all previous sections of the template, <u>documents justification for the requirement</u> , and forwards the Business Case to the Director/Regional Director (2).			
Signature		Position Title	DIRECTOR, FHPP
Print Name		Date (dd-mmm-yy)	MAR 11 2019
2. <b>Director/Regional Director (RD)</b> reviews, analyzes, and indicates if he/she supports or rejects the Business Case. If supported, forwards to the Regional Manager, MPS (5). <b>Exception:</b> for the CCG add AC (3) approval, then forward to Regional Manager, MPS (5). If rejected, provides short justification to RCM (1) and informs Regional Manager, MPS (5).			
Signature		<input checked="" type="checkbox"/> Supports Business Case	<input type="checkbox"/> Rejects Business Case
Print Name	Cheryl Webb	Justification/Comments:	
Date (dd-mmm-yy)	MAR 11 2019		
3. <b>Assistant Commissioner (AC)</b> reviews the Business Case, analysis & recommendations, determines if supported or not, provides short rationale, notifies IBMS HQ Capital Investment Group and returns documentation the Director/RD (2).			
Signature		<input type="checkbox"/> Supports Business Case	<input type="checkbox"/> Rejects Business Case
Print Name		Rationale/Comments:	
Date (dd-mmm-yy)			
4. <b>Regional Vehicle Fleet Manager (RVFM)</b> reviews the Business Case and <u>prepares an independent written analysis</u> identifying risk, possible alternatives & recommendations for the Dept. or Region, returns to the Regional Manager, MPS (5).			
Signature		Independent Analysis of submission attached x	
Print Name	Chris McOuat	Date (dd-mmm-yy)	
5. <b>Regional Manager, Materiel and Procurement Services (MPS)</b> reviews the Business Case and RVFM's written analysis, indicates if supported or not, provides comments and forwards documentation to the RDG (6). Upon return from the RDG (6), forwards to Senior Manager, MPS Operations for submission to the Director, MPS (7).			
Signature		<input type="checkbox"/> Supports Business Case	<input type="checkbox"/> Unsupportive of Business Case
Print Name		Comments:	
Date (dd-mmm-yy)			
6. <b>Regional Director General (RDG)</b> reviews the Business Case, analysis & recommendations, determines if supported or not, provides short rationale, and returns documentation to the Regional Manager, MPS (5).			
Signature		<input type="checkbox"/> Supports Business Case & recommends to CFO	<input type="checkbox"/> Rejects Business Case
Print Name		Rationale/Comments:	
Date (dd-mmm-yy)			

## Motor Vehicle Business Case – Long Form

<b>7. Director, MPS</b> <i>conducts a review of the Business Case, prepares a recommendation to the CFO and forwards the Business Case and recommendation to the CFO (8).</i>			
Signature		<input type="checkbox"/> Recommendation attached	
Print Name		<input type="checkbox"/> Recommends Business Case	<input type="checkbox"/> Unsupportive of Business Case
Date (dd-mmm-yy)			
<b>J. Final Decision</b>			
<b>8. Chief Financial Officer (CFO)</b> <i>reviews and analyzes the Business Case, accompanying analysis and recommendations. A decision is taken to approve or reject the Business Case.</i>			
Signature		<input type="checkbox"/> Business Case Approved	<input type="checkbox"/> Rejects Business Case
Print Name		Rationale/Comments:	
Date (dd-mmm-yy)			

### Record of Decision

<b>Decision entered</b> into the DVAP (by whom and date (dd-mmm-yy))	
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## **Nutton, Byron**

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**From:** dfo.donotreply-nepasrepondre.mpo@canada.ca  
**Sent:** 2019–March–11 4:00 PM  
**To:** Stockley, Melanie  
**Subject:** Attached Image  
**Attachments:** 1262\_001.pdf

## Motor Vehicle Business Case – Long Form

Please complete all sections and fill in shaded areas where applicable.

<b>A. General Information</b>			
Date (dd-mmm-yy)	28 Feb 2019	Region	Pacific
Requestor's name	Brad Fanos	Sector	Ecosystems Management Branch
RC – Business Line	5B540 310	Program	Fisheries Protection Program
<b>B. Reason For Request – Check one of the following ✓</b>			
Additional vehicle (increases Fleet size)-Skip to Section E		<input type="checkbox"/> Early replacement (includes accidents/repairs with Spec. change)	
Upgraded vehicle (Cost, Emissions, or Specification Code)		<input type="checkbox"/> Aftermarket additional options required (excluding CCG red)	
<input type="checkbox"/> Medium/Heavy Duty vehicle (Spec. Codes U, V, W, X, Y ONLY)		Other _____	
<b>C. Current Vehicle (if applicable)</b>			
Vehicle TAG Number	07-896	GMVOG Specification code	<b>Q81</b>
Make	Dodge	Current Odometer (km)	<b>65,144</b>
Model	Ram 2500 HD	Life-To-Date Maintenance Costs (\$)	11,526.98
Year	2007	12 Month Maintenance Costs (\$)	1,284.50
Fuel Type	Gas	Repair Estimate (\$)	
Colour	Grey	Towing capacity (lbs.)	
Condition		Payload capacity (lbs.)	
Special Equipment (if any) and other options	4 wheel drive, crew cab		
<b>D. DVAP Recommended Vehicle (if applicable)</b>			
Make	Chevrolet	GMVOG Specification code	<b>Q11</b>
Model	Silverado	Forecasted Purchase Cost (\$)	<b>\$31,211.00</b>
Fuel Type	<b>G</b>	Box Length (ft.)	
# of Passengers	4	Towing capacity (lbs.)	
Engine Size (L)		Payload capacity (lbs.)	
<b>E. Requirements for Proposed Vehicle (if applicable)</b>			
Date Required (dd-mmm-yy)		GMVOG Spec. Code (i.e. Q81)	<b>Q81</b>
Make	<b>Ford</b>	Forecasted DISO # (i.e. 110)	<b>115</b>
Model	<b>F-250</b>	Base Vehicle Cost (\$)	<b>\$34,103.00</b>
Fuel Type	<b>gas</b>	Additional Option Costs (\$)	
# of Passengers	<b>4</b>	Box Length (ft.) & Box Cap (Y/N)	<b>8ft long box with canopy</b>
Engine Size (L)	<b>6.2</b>	Colour (Standard = White)	
Forecasted Use : Km/Year	<b>15000</b>	Towing capacity (lbs.)	
Towing Frequency/month		Payload capacity (lbs.)	
Special Equipment (if any) and other options	4 wheel drive		
<b>F. Identify Other Alternatives to Avoid This Request</b> Ex. pooled vehicle, outsource function, or borrow from other			

## Motor Vehicle Business Case – Long Form

program. Use attachments to provide more detail if required.

### G. Provide a justification for your request (with details of the situation).

The current vehicle has had maintenance issues and must be driven in remote areas so reliability is major consideration. Vehicle use includes field sampling that requires carrying loads of equipment as well. A crew cab with 8 foot box is required for the number of passengers and their gear..

### H. Funding Source(s)

Financial Coding 5B540 310 280 lobj 50001

Amount Funded (\$)

### I. Recommendations and Approval

Indicate with a ☒

**1. Responsibility Centre Manager (RCM) / Custodian** completes all previous sections of the template, documents justification for the requirement, and forwards the Business Case to the Director/Regional Director (2).

Signature  Position Title DIRECTOR, FFHPD

Print Name Date (dd-mmm-yy) MAR 11 2019

**2. Director/Regional Director (RD)** reviews, analyzes, and indicates if he/she supports or rejects the Business Case. If supported, forwards to the Regional Manager, MPS (5). **Exception:** for the CCG add AC (3) approval, then forward to Regional Manager, MPS (5). If rejected, provides short justification to RCM (1) and informs Regional Manager, MPS (5).

Signature  ☒ Supports Business Case ☐ Rejects Business Case

Print Name Cheryl Webb, RD FMB Justification/Comments:

Date (dd-mmm-yy) MAR 11 2019

**3. Assistant Commissioner (AC)** reviews the Business Case, analysis & recommendations, determines if supported or not, provides short rationale, notifies IBMS HQ Capital Investment Group and returns documentation the Director/RD (2).

Signature ☐ Supports Business Case ☐ Rejects Business Case

Print Name Rationale/Comments:

Date (dd-mmm-yy)

**4. Regional Vehicle Fleet Manager (RVFM)** reviews the Business Case and prepares an independent written analysis identifying risk, possible alternatives & recommendations for the Dept. or Region, returns to the Regional Manager, MPS (5).

Signature Independent Analysis of submission attached x

Print Name Chris McOuat Date (dd-mmm-yy)

**5. Regional Manager, Materiel and Procurement Services (MPS)** reviews the Business Case and RVFM's written analysis, indicates if supported or not, provides comments and forwards documentation to the RDG (6). Upon return from the RDG (6), forwards to Senior Manager, MPS Operations for submission to the Director, MPS (7).

Signature ☐ Supports Business Case ☐ Unsupportive of Business Case

Print Name Comments:

Date (dd-mmm-yy)

**6. Regional Director General (RDG)** reviews the Business Case, analysis & recommendations, determines if supported or not, provides short rationale, and returns documentation to the Regional Manager, MPS (5).

Signature ☐ Supports Business Case & recommends to CFO ☐ Rejects Business Case

Print Name Rationale/Comments:

Date (dd-mmm-yy)

**7. Director, MPS** conducts a review of the Business Case, prepares a recommendation to the CFO and forwards the Business Case and recommendation to the CFO (8).



## Motor Vehicle Business Case – Long Form

Signature		<input type="checkbox"/> Recommendation attached	
Print Name		<input type="checkbox"/> Recommends Business Case	<input type="checkbox"/> Unsupportive of Business Case
Date (dd-mmm-yy)			
<b>J. Final Decision</b>			
8. <b>Chief Financial Officer (CFO)</b> reviews and analyzes the Business Case, accompanying analysis and recommendations. A decision is taken to approve or reject the Business Case.			
Signature		<input type="checkbox"/> Business Case Approved	<input type="checkbox"/> Rejects Business Case
Print Name		Rationale/Comments:	
Date (dd-mmm-yy)			

### Record of Decision

<b>Decision entered</b> into the DVAP (by whom and date (dd-mmm-yy))	
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**Nutton, Byron**

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**From:** Bryant-Gravelle, Michelle <mbryant@rti.ca>  
**Sent:** 2019-March-11 3:41 PM  
**To:** [REDACTED] Jack Smith; Blake, Dennis;  
Martin, Tanya; Inouye, Kevin; 'Harries, Elizabeth'; Nutton, Byron; Engelsjord, Michael;  
Lewis, Scott (EC); 'Groenewoud, Taylor (EC)'  
**Cc:** Darrell Desjardin; Norma Powell; Bracken, Robert (Vancouver); [REDACTED]  
**Subject:** RTI Berth Expansion Project  
**Attachments:** March 11 2019 Letter to Technical Committee.pdf

Hello everyone,

Please see the attached letter from Dennis Blake.

Regards,

**MICHELLE BRYANT-GRAVELLE**

Corporate Affairs Manager

**RIDLEY TERMINALS INC.**

PO Bag 8000, Prince Rupert, BC Canada V8J 4H3  
Tel: 250.627.3585 Cell: [REDACTED] Fax: 250.624.2389  
[mbryant@rti.ca](mailto:mbryant@rti.ca) [www.rti.ca](http://www.rti.ca)

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March 11, 2019

To: Members of the Technical Committee  
Berth Expansion Project, Ridley Terminals

First Nations:

Lax Kw'alaams,  
Lax Kw'alaams,  
Metlakatla,  
Gitxaala First Nation  
Gitga'at First Nation  
Kitselas First Nation,  
Kitselas First Nation,  
Kitsumkalum First Nation,  
Kitsumkalum First Nation,

Federal Authorities:

Michelle Bryant-Gravelle, Ridley Terminals Inc. mbryant@rti.ca  
Jack Smith, Prince Rupert Port Authority, JSmith@rupertport.com  
Tanya Martin, Transport Canada, tanya.martin@tc.gc.ca  
Kevin Inouye, Transport Canada, kevin.inouye@tc.gc.ca  
Elizabeth Harries, Transport Canada, elizabeth.harries@tc.gc.ca  
Byron Nutton, Fisheries and Oceans Canada, Byron.Nutton@dfo-mpo.gc.ca  
Michael Engelsjord, Fisheries and Oceans Canada, Michael.Engelsjord@dfo-mpo.gc.ca  
Scott Lewis, Environment and Climate Change Canada, Scott.lewis@canada.ca  
Taylor Groenewoud, Environment & Climate Change Canada,  
taylor.groenewoud@canada.ca

Hello All,

**Re: Timelines and Steps to Conclude Section 67 Process**

This letter follows up on the meeting of the Technical Committee on Thursday, March 7, 2019.

In the interests of a clear and orderly conclusions to the Section 67 process, we want to notify you of the timelines for completion of the Section 67 process.

As you know, there are no timelines specified in the *Canadian Environmental Assessment Act, 2012* related to the Section 67 process. In the absence of specified timelines, we think the test for setting timelines is reasonableness.

In applying the test of reasonableness, we have considered whether we have collected and distributed sufficient information about the Project and its potential environmental effects, and whether we have provided members of the Committee with a reasonable opportunity to review and comment on that information. We think we have.

The reasonableness of any proposed timelines must also be understood in relation to the goal of the Section 67 process, which is a determination as to whether the Project is likely to cause significant adverse environmental effects that cannot be mitigated.

Taking the foregoing into consideration, we have decided to bring the drafting of the Environmental Effects Evaluation (EEE) document to a close. To do that, we will need to receive any further comments you may have by 6 p.m. on Friday, March 15, 2019.

Please send your comments to me, Michelle Bryant-Gravelle, or Norma Powell.

We appreciate that some members of the Committee would have preferred more time to submit final comments on the draft EEE and the Project, and that some of you may not be satisfied with all of the responses that have been previously provided. At RTI we feel we have worked very hard and in good faith to respond in a meaningful way to questions and concerns that have been raised in the Technical Committee,

We expect there will be more discussion about some of these disagreements in the future, both in connection with this Project and in connection with other projects.

It is also important to bear in mind, assuming the federal authorities make a positive determination pursuant to Section 67 and RTI decides to construct the Project, that there will be further opportunities to comment on permits that RTI will require for the Project, as we apply for those Permits.

We are now targeting March 25<sup>th</sup>, 2019 as the date when we will be in a position to submit the EEE document to the Federal Authorities, together with a request for a determination pursuant to Section 67.

Thank you for your assistance with the Section 67 process.



We take this opportunity to confirm that if you have any comments on the Project in relation to Section 35 issues, they should be conveyed to [REDACTED] as soon as possible.

Yours truly,

**RIDLEY TERMINALS INC.**

Per:

[REDACTED]

Dennis Blake  
Senior Manager

cc. Darrell Desjardin, Facilitator, Technical Committee  
Norma Powell, Hemmera  
Rob Bracken, Advisian



**Nutton, Byron**

---

**From:** Marko Dekovic <MDekovic@globalterminals.com>  
**Sent:** 2019–March-12 9:46 AM  
**To:** Nutton, Byron  
**Cc:** Mike McLellan  
**Subject:** Meeting request  
**Attachments:** Signed Request for Review DFO Feb 26 2016.pdf; 2019-02-05 GCT Deltaport Expansion Fourth Berth Project - DP4 - PPE - FI....pdf

**Importance:** High

Hi Byron,

I am writing on behalf of GCT Canada regarding our proposed GCT Deltaport expansion project.

We have initially reached out to DFO on this topic on February 29<sup>th</sup>, 2016 as outlined in the attached Review Request form. At that time DFO responded (Kristin Singer) on March 10<sup>th</sup>, 2016 stating that “At this time, the Fisheries Protection Program will not be participating in the early planning/pre-environmental assessment of the Deltaport Fourth Berth Expansion.”

Subsequently, we have spent more time refining the project and conducting numerous studies to stress-test the feasibility of the project. Having come to conclusion that our incremental expansion of GCT Deltaport is feasible, we have submitted the attached Preliminary Project Enquiry to the Vancouver Fraser Port Authority Project Environmental Review (PER) process.

Subsequently we have observed VFPA comments in the media that our project is “a non-starter because”:

- “Fisheries and Oceans Canada has prohibited further land reclamation inland from Deltaport” - <https://biv.com/article/2019/03/vancouvers-deltaport-dilemma-terminal-2-or-deltaport-4>

I would like to request a meeting with DFO, as part of our early regulator engagement on our project. At that time GCT would provide an update on the proposed project and its rationale, as well as overview of conducted and proposed studies to address impacts to fish and fish habitat.

Please let me know a time and location at your earliest convenience that could accommodate this meeting and presentation from GCT.

I thank you in advance for your consideration.

Sincerely,

**Marko Dekovic**  
 Vice President, Public Affairs  
 T +1 604 267 5276

GCT Global Container Terminals Inc.  
 Suite 610, The Landing  
 375 Water Street  
 Vancouver, BC, Canada V6B 5C6  
[globalterminals.com](http://globalterminals.com)

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This email (including any attachments) may contain information that is privileged and confidential. If you are not the intended recipient, please delete this e-mail and notify us immediately.





Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

Canada

## Request for Review

### A) Contact information

Name of Business/Company:

GCT Global Container Terminals Inc. (GCT)

Name of Proponent:

GCT Global Container Terminals via authorized personnel

Director, Corporate Development & Strategy

Mailing address:

Suite 610, The Landing  
375 Water Street

City/Town:

Vancouver

Province/Territory:

BC

Postal Code:

V6B 5C6

Tel. No. :

604.267.5252

Fax No.:

604.915.9557

Email:

Select additional contact:

Contractor/Agency/Consultant (if applicable):

Amec Foster Wheeler Environment & Infrastructure,  
a Division of Amec Foster Wheeler Americas

Mailing address:

Suite 600, 4445 Lougheed Highway

City/Town:

Burnaby

Province/Territory:

BC

Postal Code:

V5C 0E4

Tel. No. :

604.294.3811

Fax No.:

604.294.4664

Email:

Is the Proponent the main/primary contact? ☐ Yes ☒ No

If no, please enter information for the primary contact or any additional contact.

Amec Foster Wheeler Environment & Infrastructure



## B) Description of Project

If your project has a title, please provide it.

Deltaport Fourth Berth Expansion

Is the project in response to an emergency circumstance\*? ☐ Yes ☒ No

Does your project involve work in water? ☒ Yes ☐ No

If yes, is the work below the High Water Mark\*? ☒ Yes ☐ No

What are you planning to do? Briefly describe all project components you are proposing in or near water.

GCT is seeking to optimize operations at it's Deltaport container facility to address anticipated growth in container traffic to the west coast of North America over the next 20 years. Optimization will require upgrading and modernizing equipment, increasing the density of equipment on the existing footprint, and expanding the area of the existing facility over and above what will be accomplished by the current Deltaport Terminal, Road and Rail Improvement Project with development of the Fourth Berth.

How are you planning to do it? Briefly describe the construction materials, methods and equipment that you plan to use.

GCT is examining options for expanding the footprint of the container facility, and is seeking regulatory input to guide ongoing engineering design work and environmental assessment.

Include a site plan (figure/drawing) showing all project components in and near water.

Are details attached? ☐ Yes ☒ No

Identify which work categories apply to your project.

- |  |   |
|--|---|
| <input type="checkbox"/> Aquaculture Operations                | <input type="checkbox"/> Log Handling / Dumps             |
| <input checked="" type="checkbox"/> Aquatic Vegetation Removal | <input type="checkbox"/> Log Removal                      |
| <input type="checkbox"/> Beaches                               | <input type="checkbox"/> Moorings                         |
| <input type="checkbox"/> Berms                                 | <input type="checkbox"/> Open Water Disposal              |
| <input type="checkbox"/> Blasting / Explosives                 | <input type="checkbox"/> Piers                            |
| <input type="checkbox"/> Boat Houses                           | <input type="checkbox"/> Riparian Vegetation Removal      |
| <input type="checkbox"/> Boat Launches / Ramps                 | <input type="checkbox"/> Seismic Work                     |
| <input type="checkbox"/> Breakwaters                           | <input checked="" type="checkbox"/> Shoreline Protection  |
| <input type="checkbox"/> Bridges                               | <input type="checkbox"/> Stormwater Management Facilities |
| <input type="checkbox"/> Cable Crossings                       | <input type="checkbox"/> Surface Water Taking             |
| <input type="checkbox"/> Causeways                             | <input type="checkbox"/> Tailings Impoundment Areas       |
| <input type="checkbox"/> Culverts                              | <input type="checkbox"/> Temporary Structures             |
| <input type="checkbox"/> Dams                                  | <input type="checkbox"/> Turbines                         |
| <input type="checkbox"/> Dewatering / Pumping                  | <input type="checkbox"/> Water Control Structures         |
| <input type="checkbox"/> Docks                                 | <input type="checkbox"/> Water Intakes / Fish Screens     |
| <input checked="" type="checkbox"/> Dredging / Excavation      | <input type="checkbox"/> Water Outfalls                   |
| <input type="checkbox"/> Dykes                                 | <input type="checkbox"/> Watercourse Realignment          |
| <input type="checkbox"/> Fishways / Ladders                    | <input type="checkbox"/> Weirs                            |
| <input type="checkbox"/> Flow Modification (hydro)             | <input checked="" type="checkbox"/> Wharves               |
| <input type="checkbox"/> Groundwater Extraction                | <input type="checkbox"/> Wind Power Structures            |
| <input type="checkbox"/> Groynes                               |   |
| <input checked="" type="checkbox"/> Habitat Restoration        |   |



☐ Ice Bridges

☐ Other Please Specify

Was your project submitted for review to another federal or provincial department or agency? ☐ Yes ☒ No

If yes, indicate to whom and associated file number(s).

At this stage, GCT is seeking early regulatory input from DFO to guide ongoing engineering design and environmental assessment.

### C) Location of the Project

Coordinates of the proposed project Latitude  N Longitude  W

OR UTM zone  ;  Easting  
 Northing

Include a map clearly indicating the location of the project as well as surrounding features.

Name of Nearest Community (City, Town, Village):

Municipality, District, Township, County, Province:

Name of watershed (if applicable):

Name of watercourse(s) or waterbody(ies) near the proposed project:

Provide detailed directions to access the project site:

The proposed project will involve an expansion of the area of the existing Deltaport container facility.

### D) Description of the Aquatic Environment

Identify the predominant type of aquatic habitat where the project will take place.

- ☒ Estuary (Estuarine)  
☐ Lake (Lacustrine)  
☐ On the bank/shore at the interface between land and water (Riparian)  
☐ River or stream (Riverine)  
☐ Salt water (Marine)  
☐ Wetlands (Palustrine)

Provide a detailed description of biological and physical characteristics of the proposed project site.

Deltaport is located on southern Roberts Bank in the frontal zone of the Fraser River estuary. Roberts Bank has been the subject of intensive study and environmental assessment in support of historic and proposed developments, including the Robert Bank Expansion Project (1977-1979), Deltaport Third Berth Project (2003-2006), and the Roberts Bank Terminal 2 Project (2015-present). The proposed project area is along the shore of the Deltaport causeway, in the intertidal zone of Roberts Bank, north of the third berth. That area



supports aquatic ecological communities of recognized importance.

Include representative photos of affected area (including upstream and downstream area) and clearly identify the location of the project.

## E) Potential Effects of the Proposed Project

Have you reviewed the Pathways of Effects (PoE) diagrams (<http://www.dfo-mpo.gc.ca/pnw-ppe/pathways-sequences/index-eng.html>) that describe the type of cause-effect relationships that apply to your project?

☒ Yes ☐ No

If yes, select the PoEs that apply to your project.

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> Addition or removal of aquatic vegetation   | <input checked="" type="checkbox"/> Placement of material or structures in water |
| <input type="checkbox"/> Change in timing, duration and frequency of flow       | <input type="checkbox"/> Riparian Planting                                       |
| <input type="checkbox"/> Cleaning or maintenance of bridges or other structures | <input type="checkbox"/> Streamside livestock grazing                            |
| <input checked="" type="checkbox"/> Dredging                                    | <input type="checkbox"/> Structure removal                                       |
| <input type="checkbox"/> Excavation   | <input type="checkbox"/> Use of explosives                                       |
| <input type="checkbox"/> Fish passage issues                                    | <input checked="" type="checkbox"/> Use of industrial equipment                  |
| <input type="checkbox"/> Grading  | <input type="checkbox"/> Vegetation Clearing                                     |
| <input type="checkbox"/> Marine seismic surveys                                 | <input type="checkbox"/> Wastewater management                                   |
| <input type="checkbox"/> Organic debris management                              | <input type="checkbox"/> Water extraction  |
| <input type="checkbox"/> Placement of marine finfish aquaculture site           |  |

Will there be changes (i.e., alteration) in the fish habitat\*? ☒ Yes ☐ No ☐ Unknown

If yes, provide description.

Changes to fish habitat will include infilling of intertidal area to support facility expansion, and dredging of a ship access channel through subtidal and intertidal habitat. The location and magnitude of change will depend on the option pursued. GCT is seeking early regulatory engagement to support ongoing design work and environmental assessment.

Will the fish habitat alteration be permanent\*? ☒ Yes ☐ No ☐ Unknown

Is there likely to be destruction or loss of habitat used by fish? ☒ Yes ☐ No ☐ Unknown

What is the footprint (area in square meters) of your project that will take place below the high water mark\*?

Unknown at this time because it will depend on the design option that will be eventually chosen.

Is your project likely to change water flows or water levels? ☐ Yes ☒ No ☐ Unknown

If your project includes withdrawing water, provide source, volume, rate and duration.

None

If your project includes water control structure, provide the % of flow reduction.

None

If your project includes discharge of water, provide source, volume and rate.

None

Will your project cause death of fish? ☐ Yes ☒ No ☐ Unknown

If yes, how many fish will be killed (for multi-year project, provide average)? What species and lifestages?



Appropriate mitigation measures to avoid serious harm to fish and aquatic organisms will be designed and implemented.

Are there aquatic species at risk ([http://www.sararegistry.gc.ca/species/aquatic\\_e.cfm](http://www.sararegistry.gc.ca/species/aquatic_e.cfm)) present? If yes, which ones?

Killer whale (southern resident and transient), harbor porpoise, humpback whale, and fin whale are present in the Strait of Georgia, but not immediately at the project site.

What is the time frame of your project?

The construction will start on 01/01/2021

and end by 01/01/2023

If applicable, the operation will start on 01/01/2023

and end by Unknown

If applicable, provide schedule for the maintenance

Not applicable.

If applicable, provide schedule for decommissioning

Not applicable.

Are there additional effects to fish and fish habitat that will happen outside of the time periods identified above? ☐ Yes ☒ No

(If yes, provide details)

Have you considered and incorporated all options for redesigning and relocating your project to avoid negative effects to fish and fish habitat?

☒ Yes ☐ No

If yes, describe.

Consultation with DFO is requested to support options evaluation.

Have you consulted DFO's Measures to Avoid Harm to Fish and Fish Habitat (<http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html>) to determine which measures apply to your project?

☒ Yes ☐ No

Will you be incorporating applicable measures into your project? ☒ Yes ☐ No

If yes, identify which ones. If No, identify which ones and provide reasons.

The project will be designed to avoid adverse effects to fisheries production to the maximum extent possible. Mitigation measures will be incorporated in the Environmental Management Plan during construction and operation. Offsetting of residual effects on fisheries production will be required.

Have you considered and incorporated additional best practices and mitigation measures recommended in relevant guidelines to avoid negative effects to fish and fish habitat?

☐ No ☒ Yes

If Yes, include a list of the guidelines being used to avoid negative effects to fish and fish habitat.

Appropriate mitigation measures will be considered and incorporated during design, and will be implemented during construction and operations.

Are there any relevant best practices or mitigation measures that you are unable to incorporate? ☐ Yes ☒ No



Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

Canada

(If yes, identify which ones.)

Can you follow appropriate Timing Windows (<http://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/index-eng.html>) for all your project activities below the High Water Mark\*?

☒ Yes ☐ No

(If no, provide explanations.)

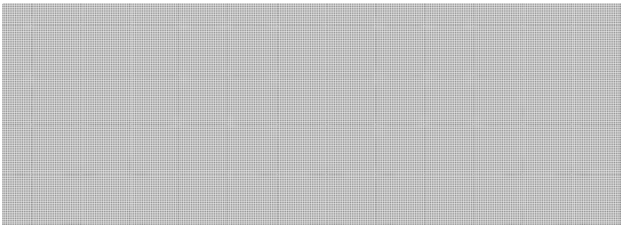
It is expected that appropriate timing windows can be incorporated into the construction schedule.

What residual effects to fish and fish habitat do you foresee after taking into account the avoidance and mitigation measures described above?

The magnitude of residual effects on fisheries production is unknown at this stage in project design.

## F) Signature

I,  (print name) certify that the information given on this form is to the best of my knowledge, correct and completed.



26/02/2016

Date

Information about the above-noted proposed work or undertaking is collected by DFO under the authority of the *Fisheries Act* for the purpose of administering the fisheries protection provisions of the *Fisheries Act*. Personal information will be protected under the provisions of the *Privacy Act* and will be stored in the Personal Information Bank DFO-PPU-680. Under the *Privacy Act*, Individuals have a right to, and on request shall be given access to any personal information about them contained in a personal information bank. Instructions for obtaining personal information are contained in the Government of Canada's Info Source publications available at [www.infosource.gc.ca](http://www.infosource.gc.ca) or in Government of Canada offices. Information other than "personal" information may be accessible or protected as required by the provision of the *Access to Information Act*.

*\*All definitions are provided in Section G of the Guidance on Submitting a Request for Review*

# GLOBAL CONTAINER TERMINALS DELTAPORT EXPANSION FOURTH BERTH PROJECT (DP4)



## Preliminary Project Enquiry

FEBRUARY 5, 2019



Submitted by GCT with expert input provided from its advisors:

**Ausenco**

 **Bennett Jones**

 **BLACK QUAY**  
CONSULTING

 **FLEISHMAN HILLARD**  
ROAD

000125



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# 1 Introduction

GCT Canada Limited Partnership (GCT), part of GCT Global Container Terminals Inc., is pleased to submit this document, which has been prepared following a pre-preliminary project enquiry meeting and as a requirement of the Vancouver Fraser Port Authority's (VFPA) Project and Environmental Review Process (PER) for the proposed expansion of its GCT Deltaport container facilities. GCT operates Deltaport container terminal (GCT Deltaport), which is located at Roberts Bank in the City of Delta, British Columbia (B.C.), on lands under lease from the VFPA.

GCT Deltaport first opened in 1997 as a two-berth container terminal operating on Pod 4 at the site. Increased volume subsequently necessitated expansion to Pod 3 in 2003, and development of the GCT Deltaport Third Berth (DP3) on Pod 5 in 2010. The existing facility consists of a three-berth, 85-hectare (ha) site and is today operating at capacity with an annual capacity of 1.8 million Twenty-Foot-Equivalent Units (TEUs). The current capacity is being expanded to 2.4 million TEUs upon completion of the Intermodal Yard Reconfiguration Project as part of the *Deltaport Terminal, Road and Rail Improvement Project* (DTRRIP). Volume to fill this added capacity is expected to be realized by 2022. Following eight years of construction and environmental monitoring of the DP3 project, it has been demonstrated that development in the inter-causeway area can be undertaken in an environmentally successful manner.

Today, GCT plays a critical role in meeting Canada's container traffic needs in a highly competitive marketplace, through its strategic, efficient and continued deployment of capital, expertise and operational resources.

Given its track record of viable and responsible expansion, GCT proposes to further expand the capacity at GCT Deltaport through an additional two million TEUs. GCT will do this by moving forward with the GCT Deltaport Expansion, Fourth Berth Project (DP4) on Pod 6 (the Project).

The proposed GCT Deltaport expansion is a response to VFPA's forecasts and independent forecasts<sup>2</sup> prepared for the VFPA and GCT of long-term growth in container terminal demand and the requirement for incremental growth in the capacity of North American west coast terminals. The proposed expansion considers VFPA's land and strategic planning and is guided by the Container Capacity Improvement Program<sup>3</sup> imperative of ensuring that appropriate container terminal capacity is available at the right time to meet Canada's trade needs, as well as the needs of the nation's trading partners.

The proposed expansion of GCT Deltaport will help the Vancouver Gateway and Canada maintain their leading position at the forefront of international trade and as a major contributor to the national economy.

The proposed expansion also responds to the change in the type and volume of trade of containerized goods shipped through Canada's west coast. Global vessel ownership is consolidating, spurring investment into larger vessels, rationalizing routes and, with fewer and larger ship-owning entities, improving the

<sup>1</sup> Working together with the VFPA, GCT implemented the Adaptive Management Strategy (AMS) for DP3

<sup>2</sup> GCT retained Black Quay Consulting to provide independent expert advice related to the analysis of container capacity on the west coast of Canada. This advice is based on a preliminary review and analysis of existing reports and historical trade forecasts.

<sup>3</sup> <https://www.portvancouver.com/development-and-permits/development/container-capacity-improvement-program>

position of vessel owners to negotiate rates and terms with terminal operators. Concurrently, demand for container terminal services and facilities are forecast to grow, especially where the largest vessels may be accommodated. In 2018, Canada's existing west coast container terminals capacity totaled 5.335 million TEUs split between Vancouver and Prince Rupert. With a combination of improvements to utilization, efficiencies and/or expansion of existing facilities, based on independent analysis commissioned by GCT, the west coast of Canada is positioned to meet growth demand until approximately 2029/30. Thereafter, additional capacity will be necessary, including the addition of Deltaport Expansion, Fourth Berth Project (DP4) at GCT Deltaport which would allow the servicing of larger vessels and the fullest optimization of the entire port complex. The expansion is essential for making sure the Port meets market demand and container capacity demand growth forecasts. The expansion, subject to relevant review processes and consultations with Indigenous communities, is also positioned to obtain all necessary approvals and authorizations.

As outlined in the PER process guideline documentation, a Preliminary Project Enquiry (PPE) document is required to be submitted to VFPA to formally trigger the PER process. This PPE document, prepared based on expert advice provided to GCT and engagement with VFPA officials and the Tsawwassen First Nation (TFN), contains contact information, Project location, and Project summary details, including a summary rationale. This document confirms the general feasibility of the proposed Project from a design and commercial perspective and outlines a reference concept upon which further design and study works may be undertaken leading toward an Application Submission as part of the PER process.

## 2 Primary Contact Information

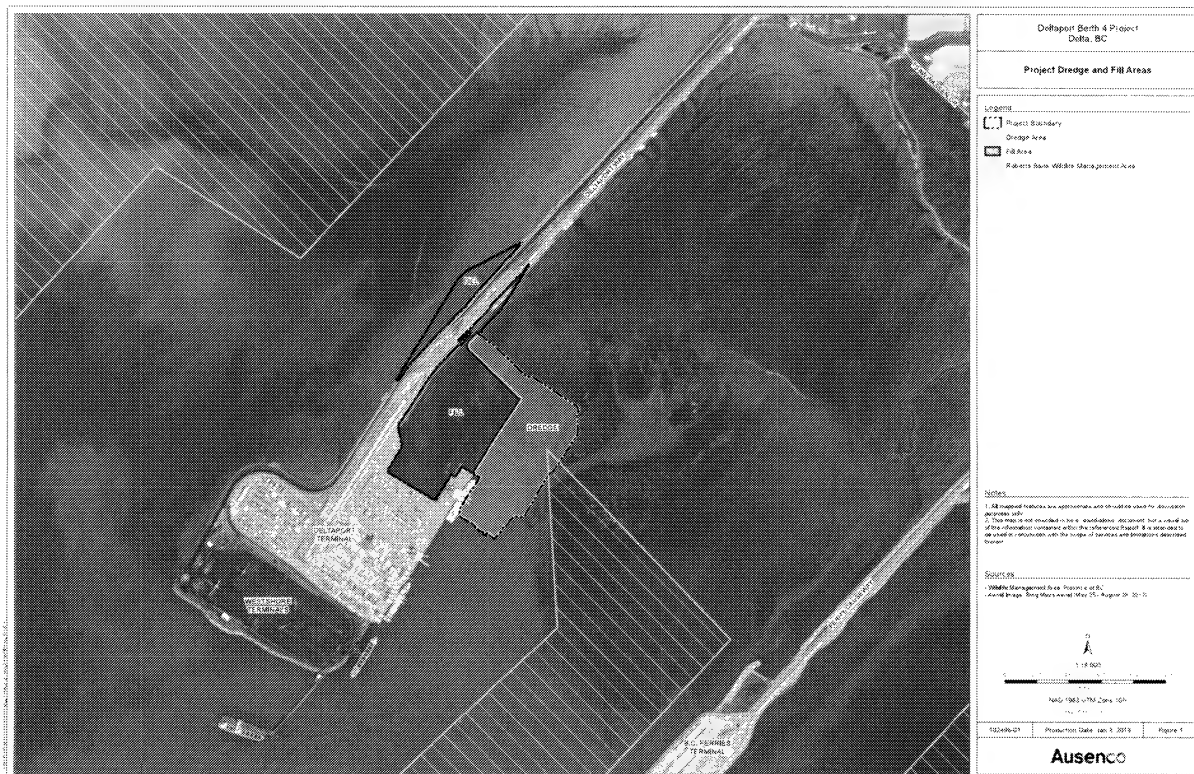
PROJECT	
Project Title:	GCT Deltaport Expansion, Fourth Berth Project (DP4)
Company Name:	GCT Canada Limited Partnership
Address:	1285 Franklin Street, Vancouver, BC, Canada V6A 1J9
PRIMARY CONTACT	
Name:	Mike McLellan, Vice President, Project Development
Company and Position:	GCT Canada Limited Partnership
Address:	Suite 610, The Landing, 375 Water Street, Vancouver, BC, Canada
Phone:	604 267 5195
Email:	mmclellan@globalterminals.com
SECONDARY CONTACT	
Name:	Marko Dekovic, Vice President, Public Affairs
Company and Position:	GCT Canada Limited Partnership
Address:	Suite 610, The Landing, 375 Water Street, Vancouver, BC, Canada
Phone:	604 267 5276
Email:	mdekovic@globalterminals.com

### 3 Project Location

The proposed Project is located at Roberts Bank, in the City of Delta, British Columbia, between the Roberts Bank Way and Tsawwassen Ferry Terminal causeways. The main portion of the Roberts Bank Wildlife Management Area (WMA) lies to the north, and a smaller section of the WMA is situated immediately to the south. Most of the Project is proposed to be constructed in intertidal and subtidal marine waters on the southside of the existing GCT Deltaport facility shown in Figure 1. The proposed Project is contiguous to the existing and operating GCT Deltaport facilities. As such, location represents a strategic factor not only in design, but in the viability of the operations. Through expansion, GCT Deltaport's existing combined facilities and economies of scale are improved. This is a critical factor that will ensure the Port maintains its competitive position in relation to other west coast, particularly US port operators.

In comparison to other potential development options at Roberts Bank, the location of the proposed Project, according to preliminary reviews and engagement with local stakeholders contributes to a smaller adverse environmental effect. The Project proposal considers traditional marine uses of Indigenous communities via effective utilization and maximization of a smaller overall footprint. This is expected to be a positive factor in environmental approvals and permitting, and in continuous engagement with Indigenous communities.

**FIGURE 1: PROJECT LOCATION**



The proposed Project is situated within VFPA-managed federal lands and waters, TFN water lots, and VFPA navigational jurisdictions shown in Figure 2. The proposed Project is located to the south of the main part of the Roberts Bank WMA and immediately to the north of a smaller part of the Roberts Bank WMA located between Roberts Bank Way and the Tsawwassen Ferry Terminal.

**FIGURE 2: LAND OWNERSHIP BOUNDARIES**



Project dredging will extend past VFPA-controlled lands into VFPA navigational jurisdiction and Provincial seabed, while Project fill requirements will remain within TFN and VFPA-controlled lands.

## 4 About Global Container Terminals (GCT)

Majority Canadian-owned and operated with headquarters in Vancouver, GCT Canada has operated on the west coast of Canada since 1907. Under long-term leases, GCT is responsible for running both GCT Vanterm and GCT Deltaport. Beyond operating these facilities, GCT Canada has also played a major role in developing Canada's Pacific Gateway and is currently the largest maritime employer in Canada. Our two East Coast facilities, GCT Bayonne (formerly Global Terminal) and GCT New York (formerly New York Container Terminal) were established in 1972 and 1995, respectively.

Our two state-of-the-art west coast terminals provide customers and carriers with reliable and convenient access to all major Asia-Pacific trade lanes and are representative of GCT Canada's considerable involvement in the development and operation of Canada's Asia-Pacific Gateway.

GCT Canada is a majority Canadian-owned company, with three major pension fund investors which are Ontario Teachers' Pension Plan (OTPP), British Columbia Investment Management Corporation (BCI) and IFM Investors. With a combined portfolio value of \$361 billion, our shareholders are long-term, experienced infrastructure investors committed to GCT Canada and the overall growth and servicing of the sector.

All three of GCT's shareholders are signatories to the United Nations Principles for Responsible Investment (UN PRI). As signatories, OTPP, IFM, and BCI each adhere to responsible investing principles considering environmental, social, and governance factors in all its portfolio companies, as reflected in their investment and strong support in GCT. <https://www.unpri.org/>

In 2014, GCT joined Green Marine, a voluntary, environmental certification program for the North American Marine Industry. As a participant, GCT has individually certified its facilities with a commitment to strengthen the North American marine sector's environmental performance through continuous improvement, stronger relations with stakeholders, and increased overall awareness of the marine industry's activities and environmental benefits. Full certification of facilities came into effect in 2015 and remain in place today. In 2018, GCT Canada joined the VFPA-endorsed Climate Smart program, aimed at achieving reductions in Green House Gas emissions (GHG). As its terminals continue to expand and increase capacity, sustainability and environmentally-responsible practices remain a core focus, both locally and globally. GCT is committed to supporting and protecting the communities where the company operates and continuously evaluates initiatives that will contribute to sustainability.



Given GCT's long history and experience operating leading container terminals on Canada's west coast and in partnership with the VFPA, we have a unique perspective on delivering competitive facility capacity and services relevant to Asia-Pacific trade. This experience underpins the capability of GCT to forecast, design, permit, deliver, construct and operate facilities in either partnership with local port authorities or independently. For further information on GCT history, ownership, leadership team, operations please see [www.globalterminals.com](http://www.globalterminals.com).



## 5 About Deltaport Expansion, Fourth Berth Project (DP4)

### 5.1 PROJECT CONTEXT AND SUMMARY

Vancouver is the preferred Canadian gateway for trade with Asia. The Port of Vancouver is Canada's largest port complex handling the most diversified range of cargo of any port in North America. The Port's growth has been facilitated through focused and coordinated government policies such as the Western Trade Corridors initiatives and the Asia-Pacific Gateway and Corridor initiative. Coupled with these initiatives are trade development programs and agreements secured by the federal government to facilitate Canada's trade. The provinces of British Columbia, Alberta, Saskatchewan and Manitoba rely on the Port for increased market access and to help them meet their trade and economic objectives. In direct and indirect terms, the Port is a major contributor to employment and the economy of Canada.

Private sector investment is a critical component to the Port's growth and competitiveness. Attracting investment into operations and infrastructure keeps the Vancouver Gateway ahead of its competitors and allows Canadian exporters and importers to gain greater access to international markets, new growth opportunities and to remain cost-competitive. By extension, this investment also contributes to employment and economic growth locally and across Canada.

As a key investor and the largest tenant of the Port, GCT anticipates the need for added future container capacity and has identified the expansion of Deltaport terminal as critical to meeting this growth. In general accordance with the 1960's original master plan for Roberts Bank, the proposed incremental expansion of the existing terminal through DP4 enables incremental development to deliver container capacity as part of a larger Port of Vancouver and west coast of Canada strategy whereby multiple participants, including the VFPA, work together to meet expanding global demand.

In summary, the proposed Project's benefits and attributes:

- Provide container terminal capacity to meet the future needs of Canadian trade, consistent with the VFPA long-term corporate strategy.
- Represent a cost-effective and timely way to address near-term container demand on the west coast.
- Utilize best available container handling technology.
- Invest in an area where there is precedence of successful and recent container development, from an operational and environmental perspective.
- Are financed by institutional investor capital, thus poses no financial risk to or demand upon the VFPA's financial capacity.
- Are proposed by an experienced terminal operator with a track-record in developing similar infrastructure at Roberts Bank.
- Include scalable delivery design that reflects changing industry trends and preserves optionality.
- Fall largely within the jurisdiction of the VFPA and is therefore subject to the VFPA's PER and permit approval process, including fill and dredging necessary to develop DP4.



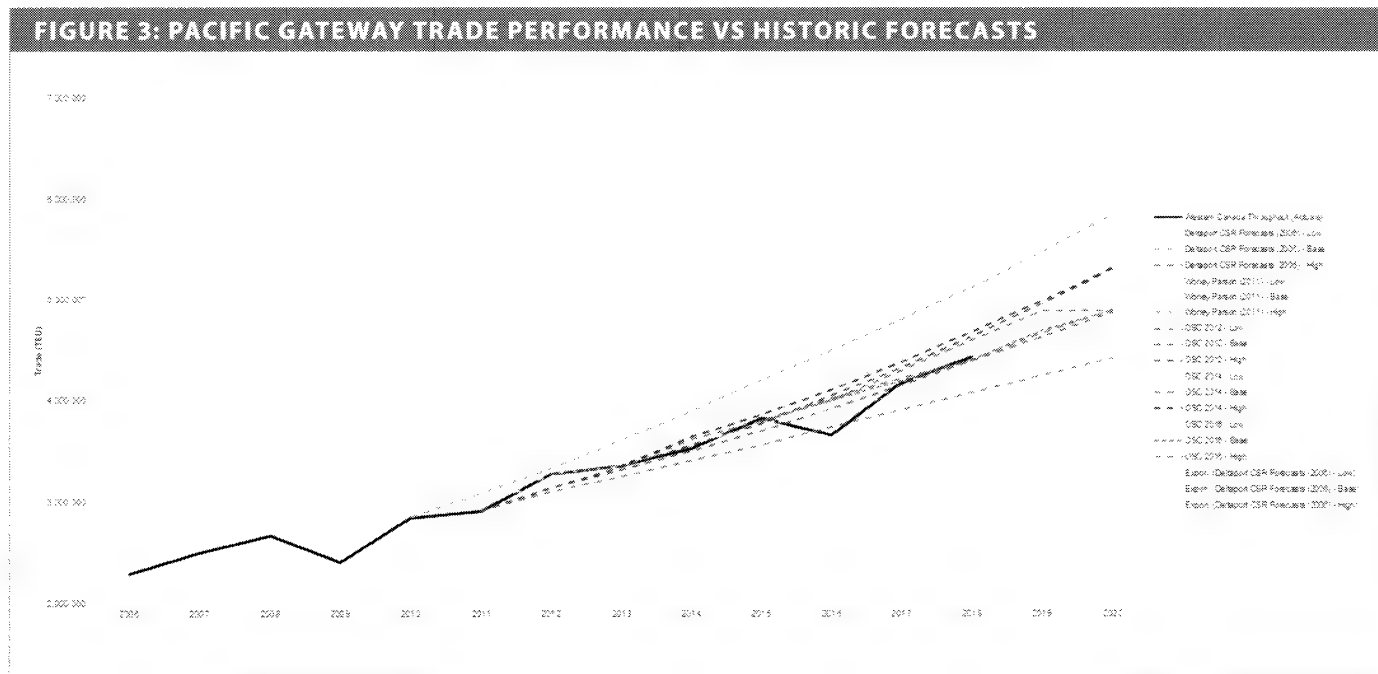
- Will follow a predictable review and assessment process, including deploying all necessary environmental mitigations, under the VFPA's PER, in conjunction with all relevant agencies.
- Leverage GCT Deltaport existing footprint and infrastructure and building upon strong working relations with labour, customers, railways, and beneficial cargo owners as well as employment and economic benefits shared with the surrounding Indigenous groups, communities, and stakeholders.

## 5.2 PROJECT RATIONALE

VFPA and GCT have a track record of collaborating to deliver needed, cost-effective capacity that has resulted in the growth of the discretionary container cargo market share for Vancouver. This has been instrumental in solidifying the Port's position as Canada's primary gateway to the Asia-Pacific. This collaboration has followed growth in container demand on Canada's west coast, with a Compounded Annual Growth Rate occurring at approximately five percent per year since 2008, according to published reports. This growth is stimulated by multiple factors. This includes economic growth in Asia, particularly China. It also includes the adoption by more shippers of containers as a preferred method of moving goods and commodities, steady economic growth in Canada and the U.S., and increased capture of US-destined discretionary cargo by Canadian terminal operators.

Independent analysis<sup>1</sup> commissioned by GCT under low-, medium- and high-trade-growth scenarios demonstrates that additional capacity requirements will be required on the West Coast of B.C. prior to 2050 under medium and high growth trade scenarios. Figures 3, 4, 5 and 6 outline the data used for analysis:

- Historical trade forecasts



<sup>1</sup> As prepared by BlackQuay

- Existing west coast capacity

**FIGURE 4: EXISTING CAPACITY AT WEST COAST CANADA TERMINALS, 2018**

Terminal	Operator	Capacity (Mill TEU/annum)	Information Source
Deltaport	GCT	1.8	Port of Vancouver website (portvancouver.com)
Centerm	DPW	0.9	Port of Vancouver website (portvancouver.com)
Vanterm	GCT	0.835	GCT Management
Fraser Surrey Docks	FSD	0.45	Port of Vancouver website (portvancouver.com)
Prince Rupert (Fairview)	DPW	1.35	Port of Prince Rupert website (rupertport.com) / VFPA RBT2 Project Rationale (robertsbankterminal2.com)
		<b>TOTAL 5.335</b>	

- Anticipated trade forecasts

**FIGURE 5: FORECAST PACIFIC GATEWAY<sup>1</sup> TRADE TO 2050 IN MILLION TEU**

	2018	2019	2020	2025	2030	2035	2040	2045	2050
Low	4.3	4.5	4.7	5.4	5.9	6.4	6.7	7	7.2
Medium	4.45	4.67	4.89	5.81	6.62	7.3	8	8.6	9.1
High	4.6	4.9	5.2	6.4	7.5	8.6	9.7	10.7	11.8

<sup>1</sup> The Pacific Gateway market comprises the Port of Vancouver and Port of Prince Rupert

- Anticipated capacity improvements

**FIGURE 6: ANTICIPATED CAPACITY IMPROVEMENTS AT WEST COAST CANADA TERMINALS TO 2050, 2018**

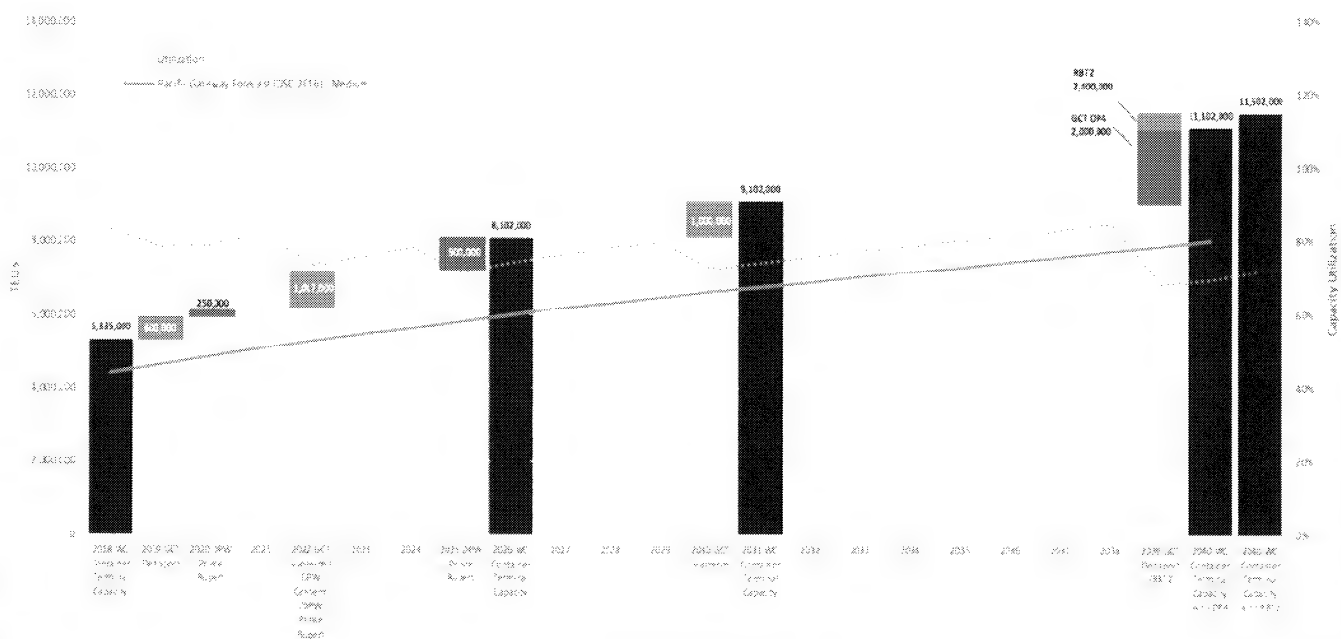
Terminal / Project	Capacity (million TEU/Yr.)	Year Online	Comments	Source
<b>GCT DELTAPORT</b>				
Active	0.6	2019	GCT Deltaport Intermodal Yard Expansion Project	Port of Vancouver website (portvancouver.com) / VFPA Container Traffic Forecast Study (OSC, 2016) GCT Management
DP4 Project	2.0	TBC	Key component of this paper is to identify appropriate timing of DP4 delivery	
<b>DPW CENTERM</b>				
Planned	0.6	2022	Assumed to be completion of Centerm Expansion Project	Port of Vancouver website (portvancouver.com) / VFPA Container Traffic Forecast Study (OSC, 2016)
<b>GCT VANTERM</b>				
Planned	0.217	2022	Assumed GCT Vanterm Phase 1	GCT Management
Proposed	1	2030	GCT Vanterm Phase 2.	GCT Management
<b>VFPA ROBERTS BANK TERMINAL 2</b>				
RBT2 Project	2.4	TBC		robertsbankterminal2.com / VFPA Container Traffic Forecast Study (OSC, 2016)
<b>DPW FAIRVIEW (PRINCE RUPERT)</b>				
Planned	0.25	2020	Assumed to be a gradual release of Phase 2a	VFPA RBT2 Project Rationale (robertsbankterminal2.com) VFPA RBT2 Project Rationale (robertsbankterminal2.com) VFPA RBT2 Project Rationale (robertsbankterminal2.com)
Planned	0.2	2022	Assumed to be completion of Phase 2B	
Planned	0.9	2025	Proposed by 2025	
<b>TOTAL</b>	<b>8.167</b>			

- Various growth scenarios

Given that low growth scenarios are not advisable for planning purposes, GCT is guided by medium-growth scenarios as the base case, which is the industry standard used for project planning. GCT is also guided by the accepted port planning principle of ensuring that maximum capacity utilization should remain at or below 85 percent.

As outlined in Figure 7, under a base-case-growth scenario, the analysis demonstrates a requirement for an additional, in-service capacity project at the scale of the proposed DP4 expansion by 2039. This assumes other planned and proposed capacity concepts are delivered in the Port of Prince Rupert and the Port of Vancouver's Burrard Inlet. In light of the scale of the proposed GCT Deltaport expansion and given the North American competitive dynamics, development of Deltaport expansion should occur in advance of further Burrard inlet expansion.

**FIGURE 7: MEDIUM TRADE GROWTH CAPACITY WATERFALL CHART**



The above demonstrates a scenario with Vanterm capacity being brought on by 2031. Given the North American competitive dynamics described herein, development of Deltaport expansion should occur in advance of Vanterm expansion.

In addition to meeting container demand growth over time, the DP4 Project is proposed in the context of changing competitive dynamics. Trends in container shipping are strengthening the case for investments that position terminal operators more effectively for inter-port competition. With the Panama Canal expansion, and the growing competition from Mexican west coast ports, competition is intensifying. Canadian and US west coast ports can expect to be challenged as the battleground for inland cargo is also reshaped. For west coast ports specifically, the US Central and Gulf regions alone account for nearly 40 percent of US container imports from Asia. These pressures are driving competition and pushing terminal operators to develop highly cost-competitive capacity in the face of multiple and varied competitors.

Furthermore, with the ocean carrier industry moving towards increased concentration into alliances and increased vessel size – which means container traffic arrives less frequently, but in greater quantities – intraport competition becomes less relevant. Ocean carriers and their cargo-owner customers have numerous terminal options on the west coast of North America to select from. The DP4 Project, seen in this light, represents, not just the most viable means of facility expansion at the Port, but the most competitive option given the strategic positioning of other North American terminals.

### 5.3 PROJECT DESCRIPTION

GCT Deltaport is an existing container terminal located on the Roberts Bank peninsula, located on Pods 3, 4, and 5, and is adjacent to the Westshore Coal Terminal, located on Pods 1 and 2. GCT Deltaport is Canada's flagship terminal, and is the world's largest and most efficient on-dock ship-to-rail discharge facility. This purpose-built terminal operates three berths with a contiguous length of 1,100 metres (3,609 feet).

In order to address above outlined gateway capacity needs, GCT is proposing to further expand the capacity of GCT Deltaport by an additional 2.0 million TEUs. The proposed Project will increase terminal capacity from its 2.4 million TEUs to 4.4 million TEUs increasing the terminal footprint by approximately 66 percent, from 85 hectares (ha) to 141 ha. This increase in terminal footprint will provide approximately 56 ha of terminal yard area, and an additional berth, balancing the terminal and resulting in an additional 2.0 million TEUs of capacity. The proposed Project has optionality to be constructed in two stages, and thus incrementally deliver capacity to market.

Stage One of the construction development is proposed to expand the Pod 5 area immediately west of the existing Berth 3, creating approximately 15 ha of land, along with additional container storage stacks and additional Container Handling Equipment (CHE). The existing Gate 3 area that services street trucks into Pod 5 will be relocated.

**FIGURE 8.1A: STAGE 1 – PROPOSED GCT DELTAPORT EXPANSION, FOURTH BERTH PROJECT – GENERAL ARRANGEMENT**





Stage Two will construct a new proposed land area - Pod 6, which will be created in the area west of the new fourth berth. Pod 6 will result in creating approximately 32 ha of land on the east side of Roberts Bank Way, along with additional container storage stacks. This stage of the Project will also include installation of additional CHE including ship-to-shore cranes.

The Stage Two construction would also create an approximately 9 ha expansion of the causeway on the west side of Roberts Bank Way to further expand the existing intermodal yard capacity to support the fourth berth. The expanded causeway will include the relocated administration building, associated truck gate, and car parking facilities. Combined, Stage One and Stage Two would increase the existing facility by approximately 56 ha total.

**FIGURE 8.1B: STAGE 2 – PROPOSED GCT DELTAPORT EXPANSION, FOURTH BERTH PROJECT – GENERAL ARRANGEMENT**



A new purpose-built short sea shipping berth is proposed to accommodate a barge vessel with an overall length of approximately 123 metres, and potential capacity of 1,044 TEUs. Having short sea shipping capability will mitigate some of the impacts associated with increased trucking by promoting movement of containers by barge and waterways. Furthermore, short sea shipping will be an opportunity for local business to invest and become part of Canada's marine port industry. The existing tug basin will be relocated to be adjacent to the proposed new fishing boat marina that will be developed in collaboration with the TFN. The marina concept will include designated road access, floating dock facilities for approximately 12 crabbing and fishing boats, a boat ramp for trailer-launching smaller boats, and related car parking.

Geotechnical improvements will be undertaken at the area of the new development. It will consist of dredging existing material and replacing it with a rock mattress to provide a foundation for the new concrete caissons, as well as dredging to provide navigation depth for vessels. It is anticipated that some dredged material will be suitable for the Project land reclamation and some material will require disposal. The current development plan is based on historical geotechnical data from the DP3 expansion project built for operations in 2010. Further detailed design and a geotechnical field investigation is planned for 2019.

The proposed Project is not expected to result in any further adverse effects to the existing dendritic channels. By extending the existing crest protection structure prior to dredging, base lowering and head-cutting, tidal effects will be minimized. Additionally, the majority of the berthing pocket excavation will take place in deep water, well below the low tide line where peak velocities are low. Further detailed modelling of the geomorphological impacts will be carried out to allow for the design to mitigate adverse effects and possibly repair damage from previous development.

GCT will commit to undertake the formulation of a coastal geomorphology technical advisory group (TAG) consisting of national and international coastal geomorphology technical experts. TAG would review the crest protection structure and modelling designs to ensure that unwanted changes from the dendritic channel formation are avoided.

A new 1,290-metre-long rock berm structure is proposed to replace the existing crest protection structure. An additional 695-metre-long mitigation structure has been included to further reduce the evolution of dendritic channels by acting as a sill for 40 ha of tidal flats at Roberts Bank. The goal for installing this structure is to stop the expansion of the dendritic channels, minimize erosion and scour adjacent to new structures, and stabilize the area of the tidal flats (see Figure 8.1C).



**FIGURE 8.1C: PROPOSED GCT DELTAPORT EXPANSION, FOURTH BERTH PROJECT – GENERAL ARRANGEMENT**



## 5.4 APPROXIMATE DESIGN SPECIFICATIONS

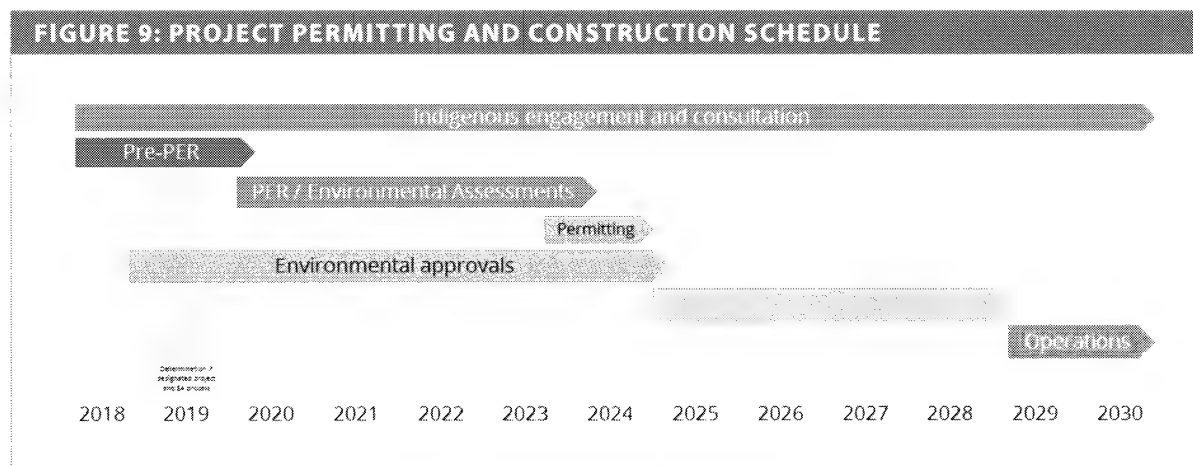
Approximate design specifications and quantities, based on the design concept for the proposed Project (subject to change during detailed design), are presented below. All CHE is to be procured, fabricated, delivered, and installed separately by GCT. Design specifications include:

- Approximately 43 ha of the seabed will be dredged, resulting in approximately 6,075,000 cubic metres (m<sup>3</sup>) of material. It is estimated that approximately 1,840,000 m<sup>3</sup> of this material will be reused as onshore fill.
- Approximately 56 ha of seabed will be filled (Stage one & Stage two combined), requiring approximately 5.35 million m<sup>3</sup> of general fill.
- Approximately 56 ha of wick drains will be installed for geotechnical settlements. An additional 476,000 m<sup>3</sup> of general fill is estimated to be required to accommodate long-term settlements.
- Container storage will be developed for 24 container storage stacks, 56 TEU long by eight containers wide by five containers high. The proposed development includes gantry runways for yard stacking cranes, pavements, and operational container fences.
- A 563-metre extension to the north end of the wharf structure will accommodate a fourth berth, built using concrete caissons. The caissons will require approximately 49,000 m<sup>3</sup> of concrete, including the concrete required for the crane rails.
- A total of seven rail tracks will be installed as extensions to the existing GCT Deltaport intermodal yard improvements, resulting in approximately 720 metres of additional lead track.

- A new short sea shipping berth, approximately 150 metres long, will be built using a sheet pile wall at the north end of the new caissons, to the west. The total length of the wall is approximately 210 metres long. It will require approximately 6,300 square metres (m<sup>2</sup>) of sheet piling.
- Installation of underground electrical, data, water, and storm drain utilities will service the infrastructure identified above, including high-mast lighting including intention to expand existing berth's shore power capability to berth 4.
- Installation of a total of 1,985 metres of crest protection mitigation structure will act as a sill for approximately 30 ha of tidal flats; 1,290 metres of this structure will replace the existing crest protection, while the remaining 695 metres of structure will be placed to minimize tidal effects on the existing dendritic channels.

## 5.5 PROJECT SCHEDULE

Referencing GCT's previous experience delivering expansion projects at Roberts Bank collaboratively with the VFPA such as DP3, the anticipated development schedule for the Project is estimated at three to four years for environmental approvals (which includes study work and, if applicable, provincial and/or federal environmental assessments processes) and another four years for construction (Figure 9). The estimate takes into consideration water work restrictions associated with juvenile salmon and crab sensitive periods. The proposed development schedule allows for delivery of the Project on a timeline consistent with the base case growth scenario described earlier. The timing may vary and will ultimately be determined by regulatory process timelines and market conditions.



### 5.5.1 ENVIRONMENTAL APPROVALS SCHEDULE

The environmental approvals schedule for the DP4 expansion Project has been divided into three phases: Pre-PER, PER and if applicable, environmental assessment (EA) processes, and other permitting. These Pre-PER activities are expected over the following 12 months, respecting matters such as seasonality.

Activities anticipated during the Project's Pre-PER phase include the following:

- Preliminary Project Enquiry (PPE)
- Continued engagement with VFPA and Indigenous communities
- Receipt of Project requirements checklist from VFPA
- Consultation PER scoping, preparation, and planning
- Field work planning
- Initiation of habitat mapping field studies to capture 2019 seasonal windows
- Initiation of geotechnical investigation and TAG
- Determinations whether the project is a designated project under Canadian Environmental Assessment Act, 2012 (CEAA) (or the regulatory regime applicable at the time) and a reviewable project under BC Environmental Assessment Act (EAA)

Activities anticipated during the Project's PER phase include the following:

- Ongoing engagement with VFPA and other regulators (as needed) and Indigenous communities
- Completion of all fieldwork and environmental assessment studies
- Public consultation

During the Project's Permitting phase, other permitting requirements (outlined in Section 5.6) may be initiated. Planning for these permits may begin prior to VFPA issuing the PER permit however these permits will not be submitted until after the PER permit is in place.

## 5.5.2 CONSTRUCTION SCHEDULE

The construction schedule is estimated to take approximately four years. In 2018, GCT engaged engineering consultants to refine the proposed project to a single feasible concept. In 2019, the geotechnical field investigations are planned to support further advancement of engineering, construction cost and construction timeline to a more Front-End Engineering Design (FEED) level.

## 5.6 REGULATORY ENGAGEMENT, PERMITS AND APPROVALS

To date, GCT's engagements with the VFPA on this proposed Project have included:

- **January 2017** – meeting to share top line details about the DP4 project with VFPA's Planning, Engineering and Real Estate leaders
- **October 2017** – meeting to review jointly commissioned report by Hemmera – "Summary Review of Regulatory Considerations – East Causeway Roberts Bank" and outlined of next steps for a proponent
- **December 2017** – large meeting of GCT's and VFPA leadership teams providing a briefing of GCT's operations and planned expansions as well as rationale for advancement of DP4 project.

- **December 2018** – VFPA Board of Directors tour of GCT Deltaport and briefing on the proposed DP4 project
- **January 2019** – pre-preliminary project enquiry meeting with the VFPA Planning and Permitting leaders

Several permits, authorizations and/or approvals are anticipated to be required for the Project. The VFPA and other relevant federal and provincial regulatory agencies will be consulted to confirm the required permits. The changes over the past decade and the proposed changes to the regulatory frameworks, including to the Fisheries Act and environmental assessment processes, have been considered and accounted for in the preliminary Project planning. Based on expert advice, the proposed Project is feasible under present and any proposed regulatory frameworks.

Key permits and approvals that may be required based on the current legislative and regulatory framework include, but are not limited to:

- VFPA's PER permit.
- Fisheries Act Authorizations for any potential unavoidable residual serious harm to, and mortality of, fish associated with Project construction.
- *Canadian Environmental Protection Act*, 1999 for any potential disposal of dredged material.
- *Navigation Protection Act* approvals for any Project works proposed on navigable waters.
- *Species at Risk Act* (SARA), permit as the Project is located within critical habitat for the Southern Resident Killer Whale.
- British Columbia *Water Sustainability Act* approvals for any potential activities that occur in and around provincial freshwater watercourses/wetlands.
- Potential permits from TFN for works or activities on TFN lands including Environment Protection Development Permits and/or Heritage Conservation Permits.
- An amended VFPA project permit for development of Pod 6 surface works improvements.

## 5.7 ENVIRONMENTAL MITIGATION

As part of its “Global Commitment” to sustainability, GCT is dedicated to conducting operations in the most responsible manner possible. We believe it is our responsibility as a business and as good citizens. While we are a global company, we are committed to strengthening the local communities where we operate and enriching the lives of those who live there – many of whom are employees of GCT. Our many initiatives include buying and hiring locally, participating in charitable events, and protecting the surrounding environment and wildlife.

Our approach to environmental management goes beyond just meeting our legal obligations. We are continually challenging ourselves to achieve new and higher standards including by reducing fuel consumption and emissions, using resources wisely, and reducing our environmental footprint – all while maintaining our economic competitiveness.

With respect to the proposed Project, GCT will study potential environmental impacts and provide appropriate mitigations to either protect or offset at or beyond the impact level of the Project. In 2010, GCT completed a similar Project in collaboration with VFPA at Deltaport that increased capacity from 1.2m TEU to 1.8m TEU. The environmental assessment process conducted for the DP3 Project was robust and identified a variety of habitats at Roberts Bank that required mitigation and protection. Working together, the VFPA, regulators and GCT implemented the Adaptive Management Strategy. After eight years of monitoring by the Scientific Advisory Committee, the 2015 report concluded that “Roberts Bank has not suffered any significant negative impacts due to the construction of a third berth at Deltaport” (*Ron Ydenberg, Member of Scientific Advisory Committee*).

GCT is committed to working with Indigenous communities to establish protocols and practices that protect the coastal and marine environment. GCT will explore all feasible mitigation measures related to critical habitat and species-at-risk, including participation in government and industry initiatives to address the health of the Southern Resident Killer Whale (SRKW) population. As a trusted operator in Canada, GCT has direct working relations with its shipping customers and local Indigenous communities, and will work with them where this contributes to the protection of the marine environment. For example, having short sea shipping capability will mitigate some of the impacts associated with increased trucking by promoting movement of containers by barge and waterways.

GCT's expert advisors have developed a habitat offsetting approach that includes identification of potential locations and actions for habitat offsetting that will require further stakeholder engagement to develop and implement. Based on preliminary studies and review of the regulatory environment, GCT understands that the habitat evaluation and offsetting requirements are dynamic in B.C. and may still be subject to further regulatory changes. GCT is preparing a regulatory strategy that can adapt in this changing environment and will allow the Project to be permitted successfully.

Emphasis will be placed on first avoiding any environmental impacts. If an impact is unavoidable, then any action will be mitigated to the extent practical. GCT agrees that replacement of lost habitat is critical and will work with environmental experts and local stewardship groups to ensure that any Project impacts are minimal. The marine and terrestrial environments in Delta are widely acknowledged for having rich ecological significance that include not just marine mammals and fish, but also are a significant location for migratory birds. The area spans the migratory Pacific Flyway and to that end, GCT is committed to working with community stewardship groups so that best practices can be applied. The link between shorebirds and biofilm is also an important ecological consideration and again, GCT will utilize the most recent and credible research to establish best practices alongside community partners.

Selection of mitigation measures will be informed by the following:

- Analysis of potential Project-related effects requiring mitigation
- Guidance from a coastal geomorphology Technical Advisory Group
- Review of mitigation measures (including best management practices) and follow-up programs undertaken for past developments in B.C. and other marine projects in Canada and internationally, and effectiveness of those mitigations

- Regulator (including guidance material from the VFPA), public, and Indigenous input
- Engagement and consultation with TFN through a proposed joint Environmental Management Committee
- Engagement and consultation with other Indigenous communities
- An evaluation of technical and economic feasibility.

Environmental mitigations may be applied to the following elements:

- Traditional or cultural resources (as determined by input from Indigenous communities)
- Air quality
- Noise and vibration
- Equipment and machinery management
- Erosion and sediment control
- Water management
- Soil and groundwater management
- Vegetation, wildlife, fish and fish habitat, and archaeological resources.

A construction environmental management plan will be developed for the proposed Project (with input from relevant regulatory agencies and local Indigenous communities) and will include references to other detailed management plans to be developed and implemented during construction and operations (e.g., emergency response plan, environmental monitoring plan, erosion and sediment control plan).

## 5.8 INDIGENOUS ENGAGEMENT

GCT is committed to continued relationship-building with Indigenous communities. As currently defined, the Project falls within or near the traditional territories, lands ratified by treaty, or other recognized areas of various groups. Given the long-standing working relationship between TFN and GCT and TFN proximity to the Project, we expect the TFN to be full and substantial participants in the Project consultation and development process. Recent communications with the TFN include on the DP4 concept:

- Ongoing engagement with TFN administration, since fall of 2016
- Presentations to Executive Council in October 2016 and follow up presentation in February 2017
- Tour of GCT Deltaport and discussions on proposed DP4 project in December 2018

GCT has an established relationship with the TFN, including a Memorandum of Understanding signed in 2010. GCT has initiated preliminary engagement with the TFN related to the Project through a series of face-to-face meetings, presentations, tours and information exchanges since 2016. GCT believes in early engagement and consultation with the TFN as part of the Project development process. As such, GCT plans to share with the TFN leadership a copy of this Preliminary Project Enquiry at the earliest possible opportunity, and engage with leadership about potential habitat offsetting initiatives and related opportunities.

As well the project falls within the traditional and/or consultative boundaries of a number of other Coastal Salish nations including in particular the Musqueam Indian Band who have inherent fishing rights, consistent with the Sparrow Supreme Court ruling. Members of other nations, such as the Tsleil-Waututh, continue to carry out traditional Indigenous harvesting of fish and marine life near the project area. In keeping with GCT's commitment to progressive Indigenous relations, consistent with current approaches of Indigenous rights and title, we expect to ensure fulsome, early stage consultation with impacted Indigenous communities in and near the project area.

More broadly, many Indigenous communities share concerns related to the impacts of marine shipping, including those related to the SRKW population. To this end, GCT is committed to technically and economically feasible mitigation measures where this addresses Indigenous concerns.

As required by the PER process, GCT will develop a fulsome Indigenous engagement and consultation plan. GCT is committed to working meaningfully with the Indigenous communities with an interest in the proposed Project.

## **5.9 PUBLIC, STAKEHOLDER AND COMMUNITY ENGAGEMENT**

It is GCT's view that it will achieve long-term sustainability of an expanded terminal through careful design that reflects a modern and innovative approach to planning and constructing such an expansion. As a member of the Delta community, GCT will continue ongoing consultation and communications with the City of Delta, its neighbouring municipalities and its many engaged community interest organizations. GCT understands that the residents and stakeholders in the GCT community expect all Project communications to be transparent, open and responsive to community hopes and concerns. This approach means that GCT addresses questions and concerns in a manner that is contemporary and community-focused. Issues to contemplate will include construction management plans and also the longer-term consideration of community impacts like noise and light. GCT has been operating in Delta for more than 20 years and the company is focused on continuing to be a responsible neighbour by being considerate, flexible, and nimble in responding to community requests and concerns.

GCT will develop a scope and plan for Project communications, engagement and consultation in the lead-up to and as part of the PER and overall regulatory approvals process. Proposed activities may include seeking input and responding effectively to the public, stakeholders and community groups through methods such as:

- Face-to-face meetings
- On-line presence
- Open houses and telephone town halls
- Traditional means of notification such as print media, direct mail, website and emails
- Innovative online consultation and community engagement tools
- Newsletters

All of the above may be supplemented by digital media-driven Project communications as well as appropriate and robust mechanisms to record and respond to all input.



## 6 Closure

We look forward to working with VFPA in determining the regulatory process under which this proposed Project will be reviewed.

## Acronyms and Abbreviations

ACRONYM / ABBREVIATION	DEFINITION
BC	British Columbia
BCI	British Columbia Investment Management Corporation
CHE	Container Handling Equipment
DP3	Deltaport Third Berth Project
DP4	Deltaport Fourth Berth Project
DPW	Dubai Ports World
DTRRIP	Deltaport Terminal, road and rail improvement Project
EA	Environmental assessment
FEED	Front End Engineering Design
FSD	Fraser Surrey Docks
GCT	GCT Canada Limited Partnership
GCT Deltaport	Deltaport container terminal
GHG	Green House Gas
OTPP	Ontario Teachers' Pension Plan
PER	Project and Environmental Review
PPE	Preliminary Project Enquiry
PRI	Principles of Responsible Investing
Project or DP4	GCT Deltaport Expansion, Fourth Berth Project
RBT2	Roberts Bank Terminal 2 Project
SRKW	Southern Resident Killer Whale
TAG	Technical Advisory Group
TFN	Tsawwassen First Nation
VFPA	Vancouver Fraser Port Authority
WMA	Wildlife Management Area

## Symbols and Units of Measure

SYMBOL / UNIT OF MEASURE	DEFINITION
%	percent
ha	hectare
m	metre
m <sup>2</sup>	square meter
m <sup>3</sup>	cubic meter
TEU	twenty-foot equivalent unit

## Sources of Studies

The various existing reports used to inform Black Quay analysis are as follows:

- Container Forecast Study – Port of Vancouver, OSC (2016).
- Potential Impact of a Failure to Develop RBT2 at VFPA, OSC (Nov 2017).
- Review of OSC's Container Traffic Forecast Study – Port of Vancouver, InterVISTAS (Aug 2018).
- Roberts Bank Terminal 2 Container Vessel Call Forecast Study, Mercator (Nov 2018).
- GCT Canada vessel calls 2015-18, GCT.
- Management listing of planned capacity inputs on the West Coast of Canada, GCT, and confirmation that these match publicly available data.
- Historic Container Vessel Visitation Figures (sourced from VFPA website).
- Historic Trade Statistics (sourced from VFPA and Prince Rupert websites).
- Deltaport Third Berth Project: Comprehensive Study Report (CSR), July 5, 2006.
- Preliminary Container Traffic Projections for PMV, 2011 to 2030, WorleyParsons, May 27, 2011.
- PMV Container Forecasts, Ocean Shipping Consultants Report, 2012.
- Container Traffic Forecast Study, Ocean Shipping Consultants Report, 2014.
- Independent confirmation of publicly available capacity claims – various sources including VFPA Website and Port of Prince Rupert Website (refer to capacity section for full source details).

## Nutton, Byron

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**From:** Koster, Kristine <KKoster@richmond.ca>  
**Sent:** 2019-March-12 12:05 PM  
**To:** Nutton, Byron  
**Subject:** RE: Habitat Banking in Richmond, BC

Greetings Byron,

I'm just following up on the message forwarded to you by Alain.

The City of Richmond would like some information regarding regulatory requirements for compensation options such as habitat banking.  
Please let me know if you're available this week for a short conference.

Please don't hesitate to let me know if you have any questions.

Thanks kindly,  
Kristine



**Kristine Koster** M.Env. | Environmental Coordinator  
[kkoster@richmond.ca](mailto:kkoster@richmond.ca) | P: 604-247-4661

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**From:** Magnan, Alain [<mailto:Alain.Magnan@dfo-mpo.gc.ca>]  
**Sent:** Monday, 11 March 2019 09:45  
**To:** Koster, Kristine  
**Cc:** Nutton, Byron  
**Subject:** RE: Habitat Banking in Richmond, BC

Hi Kristine,

I've forwarded your request to Byron Nutton who leads our program on habitat banking agreements. Byron has significant experience on this issue and will likely be able to answer any questions which the City of Richmond may have on habitat banks.

Yours truly,

Alain (Al) Magnan

Manager, Fisheries Protection Program  
Ecosystem Management Branch  
Fisheries and Oceans Canada / Government of Canada  
[Alain.magnan@dfo-mpo.gc.ca](mailto:Alain.magnan@dfo-mpo.gc.ca) / Tel: 250-756-7021 / Cell: 

Programme de la protection des pêches  
Direction des écosystèmes  
Pêches et Océans Canada / Gouvernement du Canada  
[Alain.magnan@dfo-mpo.gc.ca](mailto:Alain.magnan@dfo-mpo.gc.ca) / Tel: 250-756-7021

**From:** Koster, Kristine [<mailto:KKoster@richmond.ca>]  
**Sent:** March-11-19 8:58 AM  
**To:** Magnan, Alain  
**Subject:** Habitat Banking in Richmond, BC

Greetings Alain,

The City of Richmond is in the process of planning for major dike upgrades which will impact aquatic and riparian habitat. We are investigating compensation options and I've been tasked with gathering more information on whether there are habitat banking opportunities within the City.

Would you be interested in participating in a short conference call with my colleagues to discuss habitat banking?

Please don't hesitate to let me know if you have any questions.

Thanks kindly,  
Kristine



**Kristine Koster** M.Env. | Environmental Coordinator  
Engineering & Public Works | City of Richmond  
[kkoster@richmond.ca](mailto:kkoster@richmond.ca) | P: 604-247-4661

For any immediate operational concerns including spills to the environment, please contact the City's 24 hr Dispatch Center at 604.270.8721

## Nutton, Byron

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**From:** Engelsjord, Michael  
**Sent:** 2019–March–12 2:37 PM  
**To:** Magnan, Alain; Rotinsky, Brenda; Hwang, Jason; Cooper, Tola; Bonamis, Alston; Naito, Brian; Nutton, Byron; Pulvermacher, Holly; Benke, Anna  
**Subject:** March 14, 2019 management team meeting

I'm not available for the meeting this week. Do we want to proceed with meeting? If so, would someone record action items?

Michael Engelsjord

Team Leader, Fisheries Protection Program / Ecosystem Management Branch  
Fisheries and Oceans Canada / Government of Canada  
[Michael.Engelsjord@dfo-mpo.gc.ca](mailto:Michael.Engelsjord@dfo-mpo.gc.ca) / Tel. : 604-666-2365

Chef d'équipe, Programme de protection des pêches / Direction des écosystèmes  
Pêches et Océans Canada / Gouvernement du Canada  
[Michael.Engelsjord@dfo-mpo.gc.ca](mailto:Michael.Engelsjord@dfo-mpo.gc.ca) / Tél. : 604-666-2365

## Nutton, Byron

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**From:** Hwang, Jason  
**Sent:** 2019–March-12 2:40 PM  
**To:** Fanos, Brad  
**Cc:** Nutton, Byron; Thorpe, Suzanne  
**Subject:** FW: VFPA Habitat Bank Arrangement  
**Attachments:** 2019-03-08\_VFPA\_HBA\_BN\_for\_Decision\_DRAFT.docx; 2019-02-21 Final Draft VFPA-DFO Habitat Bank Arrangement.pdf; 2019-02-01 DFO-VFPA Arrangement-IG Consultation Summary RPT-Rev0-FINAL DRAFT.pdf

Hi Brad. VFPA package attached in this email. Byron and Suzanne have done a great job keeping this on track and steering towards an outcome that works for everyone. Note the overview comments provided by Byron in the covering email below. If you have questions let us know. Jason

**From:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Sent:** March-12-19 12:42 PM  
**To:** Hwang, Jason <Jason.Hwang@dfo-mpo.gc.ca>  
**Cc:** Thorpe, Suzanne <Suzanne.Thorpe@dfo-mpo.gc.ca>  
**Subject:** VFPA Habitat Bank Arrangement

Jason, as discussed please see the attached updated draft Briefing Note, and “final drafts” of the Arrangement and the Engagement Summary.

The Briefing Note still requires file numbers on page 1, file numbers and additional information in the footer on pages 2-4, and the routing slip (page 5) needs to be completed – my understanding is that Christina Ko can do that stuff.

**Please note that in reference to our engagement with Tsleil-Waututh, in follow-up to our March 5<sup>th</sup> meeting I am expecting written confirmation that they have no outstanding concerns but have drafted the Briefing Note as final in anticipation of receiving that confirmation.**

The copy of the Arrangement is for review and information only – the copy to be signed is making its way through the VFPA sign-off process and will be delivered to Cheryl for final counter signature.

The Engagement Summary Report will be finalized and sent out to the participating Indigenous groups this week – the attached copy is the draft we circulated to participants for comment and to date we have not received any feedback that require changes.

With respect to the discussion points from our Feb 27 meeting with Brad:

- Term of Arrangement and 5-year review: I confirmed that the conditions related to the term and the review (and the entire arrangement overall) are consistent with the template provided in the guidance document. I reviewed the Briefing Note and confirmed that the use of the template is mentioned in the Summary box and again, this time with specific reference to the term and the 5-year review, in the Strategic Considerations section.
- Authorship of Engagement report: I confirmed with VFPA that cover page of final Engagement summary report (to be sent to Indigenous groups this week) will be the same as the final draft version attached, as opposed to being on VFPA letterhead, and I note that joint authorship is confirmed in Section 1: Overview.
- Squamish engagement: I am expecting a summary from VFPA on any additional attempts to engage with Squamish for our records, but it will not affect the outcome/adequacy of the engagement to date.

Let me know if you need anything further.

*Byron Nutton*, RPBio

A/Team Lead | Chef d'équipe Intérimaire

Partnerships, Standards and Guidelines | Partenariats, Normes et lignes directrices

Fisheries Protection Program | Programme de protection des pêches

Fisheries and Oceans Canada | Pêches et Océans Canada

Pacific Region | Région du Pacifique

250-618-4268





Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

Sector Name

French translation

Sector Head Title

French Translation

UNCLASSIFIED

20##-###-####  
EKME #: #####

**Commented [MJ1]:** The GCCMS number will be generated after the docket is created

**Commented [MJ2]:** If a note is Protected B, Protected Solicitor Client Privilege, Confidential or Secret, please delete the EKME line. These types should not be saved in the system.

MEMORANDUM FOR THE REGIONAL DIRECTOR, ECOSYSTEMS MANAGEMENT  
BRANCH

**RENEWAL OF PROPONENT-LED HABITAT BANK ARRANGEMENT WITH  
VANCOUVER FRASER PORT AUTHORITY  
(FOR DECISION)**

**SUMMARY OF ADVICE TO REGIONAL DIRECTOR, ECOSYSTEMS  
MANAGEMENT BRANCH**

The purpose of this note is to seek approval of a renewed Habitat Bank Arrangement (the Arrangement) with Vancouver Fraser Port Authority (VFPA).

If approved, the Arrangement will replace the current habitat banking Working Agreement established between the DFO and VFPA in 2012 and scheduled to expire on March 31, 2019, and will be valid for a period of 15 years, with provision for review every five years.

The Arrangement establishes the terms and conditions for the renewed management of the Port of Vancouver Habitat Bank based on the guidance and template provided in *Fisheries Protection Program's Interim Guide to Proponent-led Habitat Banking* (October 2016).

Engagement and consultation with Indigenous groups with asserted or traditional territories or treaty lands within the service area of the Arrangement was jointly undertaken by DFO and VFPA.

It is recommended that you approve and provide your signature to the renewed VFPA Habitat Bank Arrangement before the current agreement expires on March 31, 2019.

## **BACKGROUND**

Over the past two years, since the release of *Fisheries Protection Program's Interim Guide to Proponent-led Habitat Banking* (October 2016), DFO and VFPA have been negotiating an updated and renewed proponent-led Habitat Banking Arrangement to replace the *Working Agreement Concerning Procedures for Development and Operation of the Port Metro Vancouver Habitat Bank* (2012).

The 2012 Agreement was set to expire in 2017, but was extended by letter to March 31, 2019 in order to allow for continued negotiation of a renewed Arrangement and for Indigenous engagement and consultation processes to be completed.

Several major considerations in the renewal of the Arrangement have been reconciled, including:

- Use of Credits by 3<sup>rd</sup> parties: The Interim Guide specifies that habitat credits can only be used by the proponent responsible for implementation of the bank; however, VFPA strongly felt they required the ability to transfer credits to offset tenant and/or third party-led infrastructure projects – a provision which was provided in the 2012 Agreement. In the proposed renewed arrangement the use of third party credits is limited to the defined service area boundaries, and is solely in relation to development activities that support VFPA in fulfilling its mandate. VFPA will retain its authority over the habitat bank and be responsible to ensure successful design, construction, monitoring, maintenance and long-term protection and stewardship of the habitat banking project sites.
- Credit valuation: The Interim Guide suggests that habitat credit valuation be mutually agreed upon based on the value of habitat and units of measure, tied to indicators, benchmarks and targets as determined through monitoring. However, there is limited guidance on when such credits can be withdrawn or moreover, whether or not bank credit can be withdrawn prior to its full function as habitat. VFPA and DFO have agreed to a process for habitat credit valuation, based upon detailed inventory and assessment of the habitat pre-construction, with the system of withdrawal based upon monitoring success and confirmation/ evaluation of the value of habitat *at the time of withdrawal* post-construction.
- Land tenure: Project site ownership or land tenure is deemed necessary to implement the habitat banking projects and ensure the long-term protection, similar to the requirements for project specific offsetting (i.e., conventional offsetting). VFPA had concerns regarding inconsistency in the requirement for land tenure (i.e., between practice and policy) however, VFPA has agreed to ensure land ownership, lease, license or other agreement is secured for all habitat banking projects until the withdrawal of the habitat credits from the bank.

.../3

## **STRATEGIC CONSIDERATIONS**

The existing Port of Vancouver Habitat Bank has been in place since September 2012 (approximately 6 ½ years) and is set to expire on March 31, 2019. The proposed new Arrangement establishes the terms and conditions for the renewed management of the Habitat Bank based on the guidance and template provided in *Fisheries Protection Program's Interim Guide to Proponent-led Habitat Banking* (October 2016).

VFPA has maintained that the Habitat Bank is an important element of their overall business plan, and supports them in achieving their goal of ensuring that fish and fish habitat are considered in the development of the Asia-Pacific gateway.

Existing Fisheries Protection Program policies support habitat banking, and identify it as one mechanism that assists DFO in achieving its strategic outcome of *sustainable aquatic ecosystems*. In addition, the currently proposed amendments to the *Fisheries Act* include provisions that will formalize and further support habitat banking as an element of DFO's overall program delivery, should those amendments receive royal assent.

The proposed term of the Arrangement is 15 years, but consistent with the template provided in the guidance document it includes a provision for DFO to exercise an option to conduct a review every 5 years.

Significant effort has been invested by both DFO and VFPA over the past 2 ½ years conducting Indigenous engagement and negotiating the terms and conditions as proposed. Failure to execute the renewed Arrangement prior to the expiration of the current agreement on March 31<sup>st</sup> may jeopardize the continuation of the Port of Vancouver Habitat Bank.

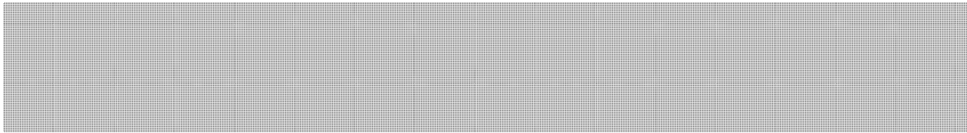
## **INDIGENOUS CONSULTATIONS**

DFO and VFPA cooperatively developed and implemented an Indigenous engagement plan, and produced and distributed a report (*Summary of Indigenous Engagement on VFPA and DFO's Habitat Bank Arrangement*) documenting the engagement and providing responses to concerns brought forward.

Based on input received during the engagement process the following changes were incorporated into the Arrangement:

- DFO and VFPA agreed to change the standardized terminology from "conservation project" to "habitat banking project" in the final version of the Arrangement to better describe the purpose of the projects and to address Indigenous concerns related to the potential for "conservation" to be considered ahead of Indigenous interests.
- VFPA updated their framework for conducting consultation associated with future proponent-led habitat banking projects.

.../4



**EXTERNAL CONSULTATIONS**

No external consultations were conducted beyond the engagement with Indigenous groups documented above.

**ADVICE AND RECOMMENDATIONS TO REGIONAL DIRECTOR, ECOSYSTEMS MANAGEMENT BRANCH**

It is recommended that you approve and provide your signature to the renewed Port of Vancouver Habitat Bank Arrangement before the current agreement expires on March 31, 2019.

\_\_\_\_\_  
Brad Fanos  
Director  
Fish and Fish Habitat Protection Program

- ☐ I concur with the recommendations
- ☐ I do not concur with the recommendations

\_\_\_\_\_  
Cheryl Webb  
Regional Director  
Ecosystem Management Branch

**Attachment(s)**

- 1) Habitat Bank Arrangement: Port of Vancouver Habitat Bank
- 2) Summary of Indigenous Engagement on VFPA and DFO's Habitat Bank Arrangement

**Commented [M3]:** List all attachments and their EKME numbers. Ensure attachments are attached and label attachments with a tab corresponding to the number in this section.



Fisheries and Oceans Canada  
Correspondence Routing Slip

Fiche d'acheminement de correspondance  
Pêches et Océans Canada

UNCLASSIFIED  
GCCMS # : 20##-###-####  
EKME # : #####

To: Cheryl Webb  
Pour: Date:

**Commented [M14]:** Do not input date. This is to be dated once all parties have approved the note.

Object: **RENEWAL OF PROPONENT-LED HABITAT BANK ARRANGEMENT**  
Objet: **WITH VANCOUVER FRASER PORT AUTHORITY**

From / De: Brad Fanos, Director, Fish and Fish Habitat Protection Program

**Commented [D5]:** For SEP and Oceans, include Brigid's information in this section.

<input type="checkbox"/> Material for the Minister Documents pour le Ministre	<input checked="" type="checkbox"/> Your Signature Votre signature	<input type="checkbox"/> Information
--	---	--------------------------------------

Remarks: This briefing note was developed in consultation with the following  
Remarques: regions/sectors: (please list who was consulted internally)

**Commented [M16]:** Any SMEs/Additional Approvers who provided input or assisted in the development of this note.

Please ensure each individual listed in this section has initialled beside their name prior to bringing the docket to the RD.

Distribution: Please indicate name(s) of people to receive a copy following the RD approval. (Remove text if no Distribution is required)

**Commented [M17]:** List any individuals who should receive a copy once approved. This is a great tool to use if you need to inform individuals about a docket, but whom do not need to be consulted during the development of the note.

Drafting Officer/ Rédacteur: NAME (TEL #) / Director / admin initials

**Commented [M18]:** Please fill this section in the same format provided. The Director should be Cheryl for FPP/SARA dockets and Brigid for Oceans/SEP dockets.

Final draft: February 21, 2019

**Habitat Bank Arrangement:**

**PORT OF VANCOUVER HABITAT BANK**

Between

**VANCOUVER FRASER PORT AUTHORITY**

AND

**HER MAJESTY THE QUEEN IN RIGHT OF CANADA**, as represented by the Minister of  
Fisheries and Oceans on behalf of Fisheries and Oceans Canada (“DFO”)

●xxxxxx, 2019

**PATH Number: 19-HPAC-00125**

**Pages 160 to / à 194**  
**are public-denied pursuant to section**  
**est public-refusé en vertu de l'article**

**68(a)**

**of the Access to Information Act**  
**de la Loi sur l'accès à l'information**



**HABITAT BANK ARRANGEMENT:  
PORT OF VANCOUVER HABITAT BANK  
SUMMARY OF INDIGENOUS ENGAGEMENT ON  
VFPA AND DFO'S HABITAT BANK  
ARRANGEMENT**

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## **1. Overview and Purpose**

Vancouver Fraser Port Authority (VFPA) currently operates a habitat bank that was created through a formal Working Agreement (2012) with Fisheries and Oceans Canada (DFO). This agreement will expire in March 31, 2019. Prior to entering into a new long-term Habitat Bank Arrangement, DFO and VFPA have undertaken engagement to ensure:

- Indigenous groups are provided the opportunity to provide input into the Indigenous engagement and consultation process for habitat bank projects that fall under the VFPA Habitat Enhancement Program (HEP); and,
- Indigenous groups are provided information regarding VFPA and DFOs intent to enter into a renewed long-term Habitat Bank Arrangement.

Both VFPA and DFO recognize the importance of undertaking meaningful engagement and consultation, based on considerations for good governance, enhanced relations and advancing reconciliation, as well as improving project outcomes. Through engagement VFPA and DFO endeavor to foster opportunities for collaboration, and seek support and input from Indigenous groups to advance the VFPA-DFO Habitat Bank Arrangement.

This report summarizes the recent engagement undertaken by VFPA and DFO to support the above-listed requirements. Content presented in this report was jointly prepared by VFPA and DFO.

## **2. Indigenous Groups within VFPA's Operational Area**

VFPA and DFO recognize the history and contemporary interests of Indigenous peoples and work to establish and maintain productive relationships through Indigenous engagement and regular communication, as well as by ensuring that the protection of fish and fish habitat are considered in the development of the Asia-Pacific Gateway.

Vancouver Fraser Port Authority operates within the asserted traditional territories of 37 Coast Salish Indigenous groups and in proximity to the treaty settlement lands of the Tsawwassen First Nation (refer to Figure 1 on the next page).

**Pages 198 to / à 199  
are withheld pursuant to section  
sont retenues en vertu de l'article**

**21(1)(b)**

**of the Access to Information Act  
de la Loi sur l'accès à l'information**

## VFPA AND DFO's HABITAT BANK ARRANGEMENT | Summary of Indigenous Engagement

- Follow up telephone calls were made to Indigenous groups to ensure receipt of the materials as well as to garner support for attendance at the face-to-face information sessions
- Face-to-face information sessions were held in 3 locations
- Additional communication and/or one-on-one meetings were offered

### 3.1 Information Packages

Information packages were shared with the Indigenous groups identified in Section 2. These packages included:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

### 3.2 Information Sessions

Three information sessions (Lower Mainland, Vancouver Island and Fraser Valley) were arranged to provide an accessible location for participants that required minimal travel. A proposed agenda was provided in advance of these sessions for review by participants.

Key components of these information sessions:

- Presentation of the materials included in the Information Packages
- Questions from Indigenous groups and response by VFPA and DFO
- Recording of information and input received as well as concerns or issues raised by Indigenous groups

The schedule for these Information sessions was as follows:

DATE	LOCATION/VENUE
<u>Information Session No.1</u>	Vancouver, BC

## VFPA AND DFO's HABITAT BANK ARRANGEMENT | Summary of Indigenous Engagement

September 11, 2018	VFPA Office
<u>Information Session No.2</u> October 16, 2018	Brentwood Bay, BC Brentwood Bay Resort
<u>Information Session No.3</u> November 29, 2018	Chilliwack, BC People of the River Referrals Office

**3.3 One-on-One meetings**

One-on-one meetings or other types of engagement activities (e.g., presentations to elders and/or leadership, community meetings) were offered. Only one request was received for this type of engagement which was received from [REDACTED]

No other requests for meetings, additional information or feedback have been received to date.

**4. Attendance Records for Information Sessions**

Information Session No. 1 – Vancouver (September 11, 2018)

ORGANIZATION	NAME OF INDIVIDUAL
VFPA	Charlotte Olson Jemma Scoble Gord Ruffo
DFO	Byron Nutton Suzanne Thorpe Shona Smith
Tsawwassen First Nation	[REDACTED]
Musqueam First Nation	
Kwikwetlem First Nation	
Semiahmoo First Nation	
Katzie First Nation	

Information Session No. 2 – Brentwood Bay, BC (October 16, 2018)

ORGANIZATION	NAME OF INDIVIDUAL
VFPA	Charlotte Olson Jemma Scoble Gord Ruffo Sinead Deery

## VFPA AND DFO's HABITAT BANK ARRANGEMENT | Summary of Indigenous Engagement

DFO	Byron Nutton Suzanne Thorpe Shona Smith
Tsartlip First Nation	
Tsartlip First Nation	
Tsartlip First Nation	
Tsartlip First Nation	
Tseycum First Nation	
Tseycum First Nation	
Tsawout First Nation	
Pauquachin First Nation	
Penelakut Tribe	
Cowichan Tribes	
Lake Cowichan First Nation	
Lyackson First Nation	
Lyackson First Nation	

## Information Session No. 3 – Chilliwack, BC (November 29, 2018)

ORGANIZATION	NAME OF INDIVIDUAL
VFPA	Charlotte Olson Jemma Scoble Gord Ruffo
DFO	Suzanne Thorpe Shona Smith
People of the River Referrals Office	
Lower Fraser Fisheries Alliance	

## VFPA AND DFO's HABITAT BANK ARRANGEMENT | Summary of Indigenous Engagement

## 5. Presentations & Other Materials

Presentations and other materials shared during the VFPA/DFO engagement included the following:

- Package of information and accompanying letter (August 2018)
  - Overview of VFPA's Habitat Enhancement Program
  - Overview of Aboriginal Consultation and Engagement on Habitat Projects Delivered for Inclusion in VFPA's Habitat Bank
  - Project Example: New Brighton Park Shoreline Habitat Restoration Project
  - Fisheries and Oceans Canada – Overview of Proponent-led Habitat Banking
- VFPA's Information Session Presentation
  - Objectives of the session
  - Overview of the Habitat Enhancement Program
  - Overview of Aboriginal Consultation and Engagement on Habitat Banking Projects
  - Project Example: New Brighton Park Shoreline Habitat Restoration Project
- DFO's Information Session Presentation
  - Requirements for a *Fisheries Act* Authorization
  - Proponent-led Habitat Banking
  - Habitat Banking Arrangements
- DFO document: Frequently Asked Questions on Proponent-led Habitat Banking

## 6. Concerns, Issues and Input Received

Several key topics were raised during this engagement process. Input that VFPA and DFO received included the following:

### VFPA-DFO Habitat Bank Arrangement:

- [REDACTED]
- Importance of ensuring that constructed project sites are protected into the future.
- [REDACTED]

### Habitat Banking (specifically):

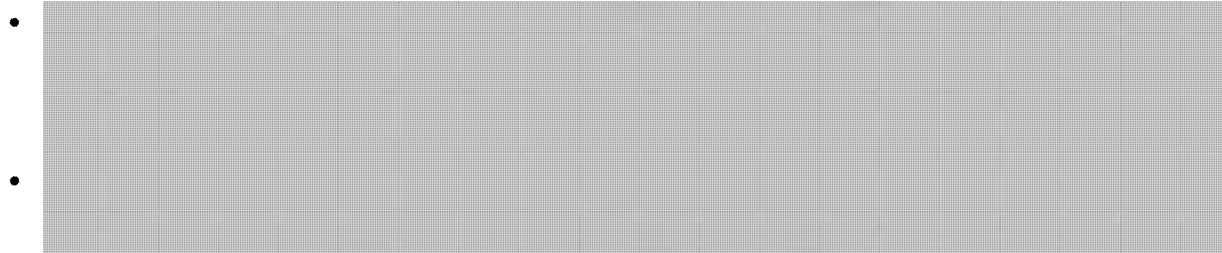
- [REDACTED]
- [REDACTED]



## VFPA AND DFO's HABITAT BANK ARRANGEMENT | Summary of Indigenous Engagement

**VFPA/HEP Engagement Processes:**

- General comment that the HEP consultation is understood and has been effective.
- General support for projects built to date and consultation process undertaken by VFPA.
- Desire for Indigenous involvement in all aspects and phases of HEP projects: provision of input to project ID, collection of data, design, construction, monitoring and specifically, in goal-setting, decision making and evaluation.
- Interest in providing input into what is monitored (i.e., testing taste and quality of fish for consumption rather than just fish presence and health).
- Sharing of information: collection data, monitoring data, fish use data, construction monitoring reports. Also sharing of important work happening by many organizations (Indigenous, NGO, governments, etc.). There is value in making information available.

**DFO Indigenous Consultation and Regulatory Processes:**

- General consultation concerns: adequacy of consultation at all levels of First Nations governance (for all aspects of habitat banking, including the policy itself). Suggestion that DFO consult at a higher level at First Nations' organizations.
- Concerns that DFO consultation is completed on a project by project basis – one project at a time when Authorization is sought. Importance of First Nations being informed of projects that do not get an Authorization due to impacts.
- Concern that the Crown is swayed to grant Authorizations if habitat is already banked.
- Concern with DFOs approach to Douglas Treaty Nations and recognition of rights.
- Guiding principles for offsetting should include that offsetting be done to also support First Nations cultural values.
- There is a need for DFO to address broader concerns related to several Aboriginal fisheries.
- General perspective that habitat is not “created” but only restored; something must be displaced to create new habitat.
- There is perception that DFO approves all authorizations.
- Comment that there is a need to use Western science and Traditional Knowledge in the monitoring and evaluation of projects.
- First Nations wish to be informed about all projects, even those that do not get an Authorization due to impacts sufficient to cause serious harm.

## VFPA AND DFO's HABITAT BANK ARRANGEMENT | Summary of Indigenous Engagement

- [REDACTED]

**General, Scientific, Technical and Cultural:**

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

**General state of the environment:**

- [REDACTED]

- Need for a balance of infrastructure development and the environment.

- [REDACTED]
- [REDACTED]

- Importance needs to be placed on protecting native species.
- Access to and health of marine aquatic species (e.g., clam beds) for First Nations.

**Other:**

- [REDACTED]

- Importance of long-term foreshore management planning and VFPA support of this work and other initiatives.

- [REDACTED]

## VFPA AND DFO's HABITAT BANK ARRANGEMENT | Summary of Indigenous Engagement

## 7. Responses and Next Steps

### **VFPA-DFO Habitat Bank Arrangement and Habitat Banking Specifically:**

In response to concern brought forward regarding the term "*conservation project*" in the context of habitat banking, DFO and VFPA have adopted the use of the term "*habitat banking projects*" in the Port of Vancouver Habitat Bank Arrangement, and DFO

Both DFO and VFPA recognize the importance of ensuring that habitat banking project sites are protected into the future. In this regard,

### **VFPA/HEP Engagement Processes:**

VFPA will review the Habitat Enhancement Program consultation process in light of the input received to consider opportunities to

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- 

### **DFO Indigenous Consultation and Regulatory Processes:**

The Government of Canada is committed to advancing reconciliation with Indigenous peoples through a renewed, nation-to-nation, Inuit-Crown and government-to-government relationship based on the recognition of rights, respect, cooperation and partnership. Fisheries and Oceans Canada is now also in the early stages of reviewing its laws and policies and consulting with Indigenous communities to identify future changes to advance reconciliation with Indigenous peoples.

## VFPA AND DFO's HABITAT BANK ARRANGEMENT | Summary of Indigenous Engagement

As outlined in DFO's "Fisheries Protection Program's Interim Guide to Proponent-led Habitat Banking", the establishment of a proponent-led Habitat Bank Arrangement does not commit DFO to the authorization or permitting of any future work, undertaking or activity that requires authorization under the *Fisheries Act* or *Species at Risk Act*. All projects are reviewed on their own merit and a decision on whether to authorize or permit is made independent of the existence of a proponent-led Habitat Bank Arrangement.

DFO is required to consult with Indigenous groups prior to making decisions under the federal *Fisheries Act*. Therefore, when a proponent proposes to use banked habitat credits as part of an Application for Authorization, DFO must undertake consultation with any potentially affected Indigenous groups in relation to the proposed development project, including the use of habitat bank credits to meet offsetting requirements.

Feedback regarding the need for the guiding principles of habitat banking to support First Nations cultural values and to specifically include Traditional Knowledge in all aspects of the planning, development, construction, monitoring and evaluation of projects will be considered by DFO for any Habitat Banking Arrangements that might be proposed in the Pacific Region. As well, DFO notes the desire for habitat banking projects to address broader concerns related to Aboriginal fisheries. This feedback has been communicated to DFO staff in Ottawa who work on development of habitat banking guidance and DFO looks forward to continued discussion on how to incorporate these concerns into policy and projects.

#### **General, Scientific, Technical and Cultural and General state of the Environment:**

DFO and VFPA appreciate the input provided at the engagement sessions and note that many of the items raised are already considered by VFPA and DFO in the context of habitat banking as well as other aspects of their respective organizations. These items and concerns will continue to be considered moving forward.

In particular, with respect to habitat banking VFPA will identify opportunities to integrate the input received, as well as the priorities and ideas raised during the engagement process. VFPA will:

- 
- 
- 
- 
- 
-

**Other:**

Comments regarding DFO's consultation process related to the review of the *Fisheries Act* have been forwarded to DFO staff conducting that consultation.

Both DFO and VFPA recognize the importance of long-term foreshore management planning and moving forward on restoration and enhancement projects, and look forward to further engagement with Indigenous groups and other levels of governments on related initiatives.

## **8. Reporting**

DFO and VFPA will report out to Aboriginal groups on any specific actions or changes from the review of the consultation process resulting from the engagement process and input shared and ensure Indigenous groups are provided information regarding the status of the DFO-VFPA habitat banking agreement. DFO and VFPA will:

- Share this report, along with copies of the habitat banking-related information presented during the engagement process.
- Notify Indigenous groups when a new DFO-VFPA Habitat Bank Arrangement is in place.
- Respond to any future questions or requests for information related to the DFO-VFPA Habitat Bank Arrangement.

The Habitat Enhancement Program provides for ongoing engagement and consultation which allows for continued opportunities to address any concern or issues. HEP will provide opportunities to Indigenous groups to identify and where possible, advance priority projects in collaboration with VFPA.

## Appendices

**Appendix 01** – Information Packages Provided to Indigenous Groups

**Appendix 02** – VFPA Presentation Material

**Appendix 03** – DFO Presentation Material

**Appendix 04** – DFO Frequently Asked Questions

**Appendix 05** – Meeting Record from September 11, 2018 Information Session (Vancouver)

**Appendix 06** – Meeting Record from October 16, 2018 Information Session (Vancouver Island)

**Appendix 07** – Meeting Record from November 29, 2018 Information Session (Fraser Valley)

## Nutton, Byron

---

**From:** Runciman, Bruce  
**Sent:** 2019–March-12 6:22 PM  
**To:** Nutton, Byron  
**Cc:** Hardacre, Kim; Boutillier, Jaclyn  
**Subject:** RE: RFCPP - West Coast Aquatic Projects Summary - BC Timber Sales Habitat Banking

Thanks for pulling all this information together Jaclyn. Lots of work and much appreciated.

Byron: it looks like at least the Taylor Borrow Pits (16-HPAC-00421), Taylor Relic Channel (16-HPAC-01309) and Taylor River Glulam (16-HPAC-00828) projects should be cross-checked against habitat banks linked to BC Timber Sales in the Port Alberni area.

Is this something you and/or Suzanne can lead or delegate?

Let us know if you need anything further?

Thanks, Bruce.

**From:** Boutillier, Jaclyn <Jaclyn.Boutillier@dfo-mpo.gc.ca>  
**Sent:** March 8, 2019 1:14 PM  
**To:** Runciman, Bruce <Bruce.Runciman@dfo-mpo.gc.ca>; Hardacre, Kim <Kim.Hardacre@dfo-mpo.gc.ca>  
**Cc:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Subject:** RFCPP - West Coast Aquatic Projects Summary - BC Timber Sales Habitat Banking

Hi Everyone,

Sorry for the delay in getting this to you... As requested, attached is an Excel spreadsheet that outlines all the information I could find in PATH referencing West Coast Aquatic RFCPP-funded projects.

- 1) I found these projects by searching in PATH under the following proponents/project managers: Sheena Falconer, Nu-u-Chah-Nulth/WCVI Aquatic Management Society, and West Coast Aquatic Stewardship Association
- 2) I came up with a list 13 RFCPP projects that are connected to WCA; I included the financial support information for each project throughout the life of the CA in the attached spreadsheet. Some of these may be irrelevant (i.e. project is not connected to BCTS or not in the area where the habitat bank is referenced), but it should give a good indication of WCA sources of support. I found this information by reviewing each year's Schedule 7's while cross referencing the Financial tab on PATH.
- 3) Connection to BC Timber Sales:

Of that list, I found 4 projects that may be of interest to the BCTS Habitat Banking inquiry. These projects have 3 criteria: they at one point or another had an active RFCPP Contribution Agreement; they included support listed from BC Timber Sales; and they were in the vicinity of Port Alberni / Taylor River. I include a summary of each year's support (either in-kind or cash) and the total \$.

- 16-HPAC-00421 - Taylor Borrow Pits  
2016-17: \$9,351  
2017-18: \$27,155
- 16-HPAC-01309 - Taylor Relic Channel  
2017-18: \$39,261
- 16-HPAC-00828 - Taylor River Glulam  
2014-15: \$44,312  
2015-16: \$53,392
- 13-HPAC-PA6-00077-AVRFR - Urban Streams  
2013-14: \$1,000

Support provided to WCA from BC Timber Sales in the Port Alberni/ Taylor River area from 2013-2018 = \$174,471

Let me know if you have any questions or require clarification on any of the above noted. If it helps with the Habitat Banking inquiry, I'm also happy to try a data mining exercise to find other RFCPP-project recipients with links to BCTS in the area?

Kindly,

**Jaclyn Boutillier**

Fisheries Protection Biologist  
Fisheries Protection Program, Ecosystems Management Branch  
Fisheries and Oceans Canada/Government of Canada  
[Jaclyn.Boutillier@dfo-mpo.gc.ca](mailto:Jaclyn.Boutillier@dfo-mpo.gc.ca)/Tel: 250 756-7263

Programme de protection des pêches, Gestion des écosystèmes  
Pêches et Océans Canada/Gouvernement du Canada  
[Jaclyn.Boutillier@dfo-mpo.gc.ca](mailto:Jaclyn.Boutillier@dfo-mpo.gc.ca)/Tel: 250-756-7263

**From:** Hardacre, Kim <Kim.Hardacre@dfo-mpo.gc.ca>

**Sent:** Monday, February 25, 2019 4:37 PM

**To:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>

**Cc:** Boutillier, Jaclyn <Jaclyn.Boutillier@dfo-mpo.gc.ca>; Runciman, Bruce <Bruce.Runciman@dfo-mpo.gc.ca>

**Subject:** RE: Taylor River ... BCTS

Byron, Jaclyn and I are actually going out to Port Alberni on Thursday (not tomorrow) for the day so if you (or anyone else familiar with the Habitat Banks) would like to come with us to check this out, let me know and I'll get a vehicle that seats more than 2 (currently have the Ford Ranger). If not, we can document anything that you want us to keep an eye out for.

Kim

**From:** Thorpe, Suzanne <Suzanne.Thorpe@dfo-mpo.gc.ca>

**Sent:** 2019-February-25 4:20 PM



**To:** Runciman, Bruce <Bruce.Runciman@dfo-mpo.gc.ca>; Hardacre, Kim <Kim.Hardacre@dfo-mpo.gc.ca>

**Cc:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>

**Subject:** Taylor River ... BCTS

s.16(2)(c)

s.21(1)(b)

Hi you two:

I was just checking the [REDACTED]

I understand Kim is travelling there to look at the RFCPP funded work tomorrow.

Let's check into this and [REDACTED]

**Files are here:**

Attached:

1. [REDACTED]
2. [REDACTED]
3. [REDACTED]
4. [REDACTED]

Hopefully we aren't all [REDACTED] here with funding and banking.

S.

### **Suzanne Thorpe**

Partnerships, Standards and Guidelines/ Partenariats, normes et lignes directrices

Fisheries Protection Program/ Programme de protection des pêches

Ecosystem Management Branch / Direction de la gestion des écosystèmes

Fisheries and Oceans Canada (DFO), Pacific Region/ Pêches et Océans Canada, Région du Pacifique

Government of Canada/ Gouvernement du Canada

200-401 Burrard Street, Vancouver BC V6C 3S4 (13<sup>th</sup> Floor)/ 401 Burrard Street, bureau 200, Vancouver (C.-B.) V6C 3S4

Telephone: (604) 666.3512 or Mobile: [REDACTED]

**Pages 213 to / à 214  
are withheld pursuant to section  
sont retenues en vertu de l'article**

**19(1)**

**of the Access to Information Act  
de la Loi sur l'accès à l'information**

## Nutton, Byron

---

**From:** Thorpe, Suzanne  
**Sent:** 2019–March-13 10:12 AM  
**To:** Nutton, Byron  
**Subject:** FW: Habitat Banking in Richmond, BC

Would you like me to follow up with this?

S.

**From:** FPP.PAC.Enquiries / Renseignements.PPP.PAC (DFO/MPO) <XPAC.EnquiriesPacific@dfo-mpo.gc.ca>  
**Sent:** Wednesday, March 13, 2019 9:46 AM  
**To:** Thorpe, Suzanne <Suzanne.Thorpe@dfo-mpo.gc.ca>  
**Subject:** FW: Habitat Banking in Richmond, BC

Hi Suzanne,

We received the below e-mail into the enquires folder requesting some information regarding habitat banking.

I wasn't sure if this is something we would participate in at this time but I thought I would check before sending back our template response for pre-project engagement request.

Just let me know what you think would be the best course of action.

Cheers!

Vanessa Holland

Fisheries Protection Biologist, Fisheries Protection Program  
Fisheries and Oceans Canada | Government of Canada  
[Vanessa.Holland@dfo-mpo.gc.ca](mailto:Vanessa.Holland@dfo-mpo.gc.ca) | Tel: 604-666-0280

Biologiste de la protection des pêches, La protection des pêches Programme  
Pêches et Océans Canada | Gouvernement du Canada  
[Vanessa.Holland@dfo-mpo.gc.ca](mailto:Vanessa.Holland@dfo-mpo.gc.ca) | Tél: 604-666-0280



Please consider the environment before printing this email

**From:** Koster, Kristine <KKoster@richmond.ca>  
**Sent:** March-11-19 12:14 PM  
**To:** FPP.PAC / PPP.PAC (DFO/MPO) <[ReferralsPacific.XPAC@dfo-mpo.gc.ca](mailto:ReferralsPacific.XPAC@dfo-mpo.gc.ca)>  
**Subject:** Habitat Banking in Richmond, BC

Greetings,

The City of Richmond is in the process of planning for major dike upgrades which will impact aquatic and riparian habitat. We are investigating compensation options and I've been tasked with gathering more information on whether there are habitat banking opportunities within the City.

Could you please tell me if someone from DFO could participate in a short conference call with my colleagues to discuss habitat banking?

Please don't hesitate to let me know if you have any questions.

Thanks kindly,  
Kristine



**Kristine Koster** M.Env. | Environmental Coordinator  
Engineering & Public Works | City of Richmond  
[kkoster@richmond.ca](mailto:kkoster@richmond.ca) | P: 604-247-4661

For any immediate operational concerns including spills to the environment, please contact the City's 24 hr Dispatch Center at 604.270.8721

**Nutton, Byron**


---

**From:** Torres, Nora  
**Sent:** 2019–March-13 10:27 AM  
**To:** Runciman, Bruce; Hardacre, Kim; Nutton, Byron; Boutillier, Jaclyn; Mjoen, David; Geoffrion, Loraine; Mitton-Wilkie, Cynthia J; Smith, Lee-Ann; Webster, Natalie; Guitard, Alain; Morrisette, Manon; Beaulieu, Nathalie; Pouliot, France (PHP); Hominick, Craig; Jacobi, Carol; Isaac-Mann Crosby, Tracey; Forest, Isabelle; Robichaud, Guy; Godin, Carole; Dobbin-Vincent, Connie; Thorne, Blair; Van Ingen, Richard  
**Subject:** update: RFCPP meeting - last meeting

Hi everyone,

Just sending you the dial in number.

Dial in #: 1-877-413-4788



## Nutton, Byron

---

**From:** Runciman, Bruce  
**Sent:** 2019-March-13 10:58 AM  
**To:** Hardacre, Kim  
**Cc:** Nutton, Byron  
**Subject:** FW: Update Request: 2018-HSP-8287 - North Coast Cetacean Society

FYI – just closing the communications loop: this CA has been with NHQ for AIP since January 10 ...

**From:** True, Eric <Eric.True@dfo-mpo.gc.ca>  
**Sent:** March 13, 2019 6:40 AM  
**To:** Runciman, Bruce <Bruce.Runciman@dfo-mpo.gc.ca>  
**Subject:** RE: Update Request: 2018-HSP-8287 - North Coast Cetacean Society

Good day Bruce,

The document has been reviewed and is in the process of being signed here, at that AIP level.

Thank you.

Eric

**From:** Runciman, Bruce <Bruce.Runciman@dfo-mpo.gc.ca>  
**Sent:** Tuesday, March 12, 2019 11:08 PM  
**To:** True, Eric <Eric.True@dfo-mpo.gc.ca>  
**Cc:** Lyen, Ron <Ron.Lyen@dfo-mpo.gc.ca>; Hardacre, Kim <Kim.Hardacre@dfo-mpo.gc.ca>  
**Subject:** Update Request: 2018-HSP-8287 - North Coast Cetacean Society

Hi Eric.

Can you please provide an update as to the status of CA 2018-HSP-8287 (North Coast Cetacean Society) with NHQ?

Thanks, Bruce.

***Bruce Runciman, MSc***

Partnerships Coordinator, Fisheries Protection Program  
Fisheries and Oceans Canada / Government of Canada  
[bruce.runciman@dfo-mpo.gc.ca](mailto:bruce.runciman@dfo-mpo.gc.ca) / Tel: (250) 851-4849 / Fax (250) 851-4951

Coordonnateur des partenariats, Programme de Protection des Pêches  
Pêches et Océans Canada / Gouvernement du Canada  
[bruce.runciman@dfo-mpo.gc.ca](mailto:bruce.runciman@dfo-mpo.gc.ca) / Tél: (250) 851-4849 / Fax (250) 851-4951

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**Nutton, Byron**

---

**From:** Nutton, Byron  
**Sent:** 2019–March-12 8:40 AM  
**To:** 'Lindsey Ogston'  
**Subject:** RE: VFPA Habitat Bank  
**Attachments:** 2019-02-21 Final Draft VFPA-DFO Habitat Bank Arrangement.pdf

Hi Lindsey,

Please see attached most recent (February 21<sup>st</sup>) draft of the arrangement. As discussed, very similar to the version shared with you last fall.

Sorry for the delay. I discussed this with VFPA on Thursday but have been out of the office.

Thanks again for your time.

Regards,

Byron

**From:** Lindsey Ogston [REDACTED]  
**Sent:** 2019–March-11 2:37 PM  
**To:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Subject:** RE: VFPA Habitat Bank

Hi Byron

Thanks again for meeting with us. I was wondering if you got feedback on being able to share the revised DFO-VFPA agreement? Ideally, we'd like to review it before writing any sort of letter.

Cheers,

Lindsey

---

**From:** Nutton, Byron [<mailto:Byron.Nutton@dfo-mpo.gc.ca>]  
**Sent:** Friday, March 01, 2019 8:07 AM  
**To:** Amanda King  
**Cc:** Lindsey Ogston  
**Subject:** RE: VFPA Habitat Bank

Hi Amanda,

Thanks again for making the time to meet with me. I am also planning on bringing Suzanne Thorpe, the Senior Biologist working on habitat banking to support our discussions.

In addition, I reached out to our Indigenous engagement team to see if any of them had an interest in attending, not necessary to support our discussions on habitat banking but more in terms of an opportunity to put faces to names and build/strengthen the relationship at our working level. In this regard, Shona Smith is available and interested in joining

us, but I don't want it to seem like I'm stacking the deck so I wanted to check with you first before confirming with her. Please let me know if this is OK with you. Either way, I'm looking forward to meeting with you on Tuesday.

Thanks again.

Regards,

Byron

*Byron Nutton, RPBio*

A/Team Lead | Chef d'équipe Intérimaire  
Partnerships, Standards and Guidelines | Partenariats, Normes et lignes directrices  
Fisheries Protection Program | Programme de protection des pêches  
Fisheries and Oceans Canada | Pêches et Océans Canada  
Pacific Region | Région du Pacifique

250-618-4268

**From:** Amanda King [REDACTED]  
**Sent:** 2019–February-27 6:00 PM  
**To:** Nutton, Byron <[Byron.Nutton@dfo-mpo.gc.ca](mailto:Byron.Nutton@dfo-mpo.gc.ca)>  
**Cc:** Lindsey Ogston [REDACTED]  
**Subject:** RE: VFPA Habitat Bank

Hi Byron,

Sure, we are happy to meet with you in person and are good to host here. I will send you a meeting invite.

Thank you,

Amanda

**Amanda King**

Treaty, Lands, and Resources Department  
Tsleil-Waututh Nation  
NEW ADDRESS  
3178 Alder Court  
North Vancouver, BC V7H 2V6

Office [REDACTED]  
Mobile [REDACTED]

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**From:** Nutton, Byron [<mailto:Byron.Nutton@dfo-mpo.gc.ca>]  
**Sent:** Tuesday, February 26, 2019 7:04 PM  
**To:** Amanda King  
**Cc:** Lindsey Ogston  
**Subject:** Re: VFPA Habitat Bank

Thanks for getting back to me so quick.

I am available for 2:00 the afternoon of Tuesday, March 5th. I'm thinking an hour is probably enough, but I am free until the end of the day.

A call is good, but I could also come over and meet you in person if you'd prefer. Not sure if this warrants it on its own, but as our program moves forward (changes taking place here at DFO) I imagine we we be working together more often and it certainly can't hurt to be better acquainted.

I'll leave it with you to decide what works best, just let me know.

Thanks,

Byron

Sent from my BlackBerry 10 smartphone on the Rogers network.

**From:** Amanda King  
**Sent:** Tuesday, February 26, 2019 4:48 PM  
**To:** Nutton, Byron  
**Cc:** Lindsey Ogston  
**Subject:** RE: VFPA Habitat Bank

Hi Byron,

We have been incredibly busy at the office so thank you for following-up with me again.

Lindsey Ogston, Environmental Programs Manager, and I can join you on a call. We are available the afternoons of March 5, 6 or 7. Does 2 pm work for you on one of these days?

Thanks,

Amanda

**Amanda King**

Treaty, Lands, and Resources Department  
 Tsleil-Waututh Nation  
 NEW ADDRESS  
 3178 Alder Court  
 North Vancouver, BC V7H 2V6

Office:

Mobile [REDACTED]

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**From:** Nutton, Byron [mailto:Byron.Nutton@dfp-mpo.gc.ca]

**Sent:** Tuesday, February 26, 2019 4:38 PM

**To:** Amanda King

**Subject:** RE: VFPA Habitat Bank

Hi Amanda,

I am just following up to see if you have had a chance to consider my e-mail below.

I do hope to hear from you at your earliest convenience.

Thank you,

Byron

**From:** Nutton, Byron

**Sent:** 2019-February-20 4:09 PM

**To:** [REDACTED]

**Subject:** VFPA Habitat Bank

Hi Amanda,

I am wondering if you have time to discuss with me a couple issues related to VFPA's habitat bank, specifically:

- renewal of the DFO-VFPA habitat bank arrangement; and
- VFPA's habitat banking project at Maplewood Flats.

I understand from VFPA that since the last time TWN, DFO and VFPA met together in May 2018 that you have been working with them on both of these items, and I am interested in re-connecting with TWN as I have not done so since [REDACTED] departure in October.

Please let me know if you have some time to discuss these items – perhaps starting with a phone call to simply connect and plan for a more detailed discussion, if appropriate.

I look forward to hearing from you.

Thanks for your time,

*Byron Nutton, RPBio*

A/Team Lead | Chef d'équipe Intérimaire

Partnerships, Standards and Guidelines | Partenariats, Normes et lignes directrices

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**Pages 260 to / à 295**

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## Nutton, Byron

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**From:** Nutton, Byron  
**Sent:** 2019–March-12 2:46 PM  
**To:** 'Amanda King'; 'Lindsey Ogston'  
**Cc:** Thorpe, Suzanne  
**Subject:** record of discussion  
**Attachments:** DRAFT\_2019-03-05\_DFO-TWN\_ROD\_Re\_VFPA\_Habitat\_Bank.docx

Hi Amanda and Lindsey,

Thanks again for your time - Suzanne, Shona and I appreciated the opportunity to discuss some areas of common interest with you, and we look forward to continuing to work with TWN.

We took the liberty of trying to summarize our discussion in the attached document, and would appreciate if you could review it and let me know whether we missed or mis-characterized anything.

As captured in that summary I have already forwarded the current draft of the bank arrangement to Lindsey this morning.

Thanks again.

Regards,

*Byron Nutton*, RPBio

A/Team Lead | Chef d'équipe Intérimaire  
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## **Fisheries and Oceans Canada (DFO) – Tsleil-Waututh Nation (TWN) Discussion on the Port of Vancouver Habitat Bank: Record of Discussion**

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**Draft 2019-03-11**

**Date:** Tuesday, March 5, 2019

**Time:** 2:00 - 3:30 pm

**Location:** Tsleil-Waututh Nation, People of the Inlet Office, 3075 Takaya Drive, North Vancouver, BC

### **Participants:**

Amanda King, TWN, Senior Referrals Analyst

Lindsey Ogston, TWN, Environmental Stewardship Coordinator

Byron Nutton, DFO Fisheries Protection Program, Team Lead

Suzanne Thorpe, DFO Fisheries Protection Program, Senior Biologist

Shona Smith, DFO Fisheries Protection Program, Client Liaison and Partnerships Coordinator

### **Agenda Items:**

1. Proposed renewal of Habitat Banking Arrangement between VFPA and DFO
2. Maplewood Flats proposed Habitat Bank project by VFPA

### **Discussion:**

#### **RE: Renewal of Habitat Banking Arrangement between VFPA and DFO**

- DFO explained context and intent to renew the Habitat Bank Arrangement with Vancouver Fraser Port Authority (VFPA) prior to March 31, 2019.
- TWN confirmed that since the last TWN-DFO-VFPA meeting (May 25, 2018) they have been apprised of the HBA through discussions they have held with VFPA and that an earlier copy of the HBA (draft August 2018) was shared by VFPA to TWN.
- DFO discussed the changes that have been made subsequent to the August draft (e.g., change in terminology from conservation projects to habitat banking projects, minor editorial changes).
- DFO confirmed that measures to address previous concerns raised by TWN have been incorporated into HBA, per below, with one exception.
  - ✓ Concerns surrounding the “sale” of credits are addressed under the proposed new HBA in that VFPA would not be able to sell/transfer credits, but VFPA could use their credits on behalf of a third party as described in Annex A.

- ✓ Early engagement on the development of habitat banking projects is addressed and included in Annex G: Indigenous Consultation and Engagement: Habitat Banking Project Development by HEP (VFPA's Habitat Enhancement Program).
- ✓ Consultation upon contemplation of a regulatory decision is addressed in Appendix F: Indigenous Consultation and Engagement: Use of Habitat Credits to Meet Offsetting Requirements of a *Fisheries Act* Authorization.
- Consultation if/when habitat banking credits are used as offsets for projects located outside of the local area – not addressed. However unlikely, a situation could arise where DFO's scope of consultation on impacts related to a future Authorization might not include TWN, although credits from habitat banking project in TWN traditional territory are used as offsetting.
- TWN confirmed that they are also negotiating a separate TWN-VFPA agreement related to habitat banking, and would ensure that it address the outstanding item related to consultation when habitat banking credits are used
- TWN would like to consider / review: 1) draft final HBA, and 2) Indigenous Engagement Summary report

**ACTION:** DFO to discuss sharing of documentation with VFPA and send to TWN. On March 12 Byron provided the current draft of the HBA to Lindsey, VFPA confirmed they will send Indigenous Engagement Summary report when it is finalized.

**ACTION:** TWN will prepare correspondence for DFO to indicate that they are not opposed to the VFPA-DFO Arrangement and can turn this around relatively quickly.

#### **RE: Maplewood Flats (MF)**

- DFO is expecting to receive package re: banking aspects for MF project – as completely separate from the offsetting package Authorized for VFPA's Centerm Expansion.
- DFO will consider the appropriateness of the offsetting and any tangible benefits to fish and fish habitat from the proposed bank @ MF
- TWN expressed that justification is needed (e.g., channel-work) and fulsome explanations to facilitate their understanding the benefits; they are expecting a "net environmental gain" – which may include benefits to crab fishery, coho/chum/pink, eelgrass community, etc.; some noted concerns with use of productivity models.

**TWN is expecting DFO to complete technical review for habitat banking success and project benefits.**

#### **RE: TWN programs**

- Services: archaeological assessments, environmental monitoring (mostly project related – construction/ site monitoring ... could consider long-term monitoring in future)
- Data collection: fish counts (Indian River), water quality information, forage fish surveys, eelgrass, count mapping, shore zone data collection; expanding to juvenile escapement/ netting & cumulative effects data collection) => issues with DATA HOUSING, but all Western Science data available for sharing.

- TWN is currently redrafting their stewardship policy. This policy guides TWN's decision making process with respect to all of the surface and subsurface air, land, water, cultural, and natural resources within the TWN consultation area.

## Nutton, Byron

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**From:** Nutton, Byron  
**Sent:** 2019–March-12 2:50 PM  
**To:** Thorpe, Suzanne  
**Subject:** RE: 2019-03\_Letter to DND re: Habitat Banking Arrangement renewal under revised FA

Looks good, just one suggestion to simplify this sentence:

In the interim ~~timeframe pending legislative revision~~, DFO will continue to consider ~~upcoming transactions associated~~ proposed withdrawals from the habitat bank in accordance with the existing agreement.

**From:** Thorpe, Suzanne <Suzanne.Thorpe@dfo-mpo.gc.ca>  
**Sent:** 2019–March-12 12:11 PM  
**To:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Subject:** 2019-03\_Letter to DND re: Habitat Banking Arrangement renewal under revised FA

Hey B.

For discussion Wednesday BILAT, or today ... send directly to Mike Waters?

### Suzanne Thorpe

Partnerships, Standards and Guidelines/ Partenariats, normes et lignes directrices  
Fisheries Protection Program/ Programme de protection des pêches  
Ecosystem Management Branch / Direction de la gestion des écosystèmes  
Fisheries and Oceans Canada (DFO), Pacific Region/ Pêches et Océans Canada, Région du Pacifique  
Government of Canada/ Gouvernement du Canada  
200-401 Burrard Street, Vancouver BC V6C 3S4 (13<sup>th</sup> Floor)/ 401 Burrard Street, bureau 200, Vancouver (C.-B.) V6C 3S4  
Telephone: (604) 666.3512 or Mobile: (604) 312.7964

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## Nutton, Byron

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**From:** Nutton, Byron  
**Sent:** 2019–March-13 12:08 PM  
**To:** 'Norma Powell'  
**Subject:** RE: 2200 - DFO #18-HPAC-00245 Ridley Terminal Berth - FAA

I am available tomorrow from 1000-1100 or 1300-1400, or anytime Friday after 1030.

**From:** Norma Powell <npowell@hemmera.com>  
**Sent:** 2019–March-06 12:21 PM  
**To:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>; Joe Walker [REDACTED] Darrell Desjardin <d-desjardin@hemmera.com>  
**Subject:** 2200 - DFO #18-HPAC-00245 Ridley Terminal Berth - FAA

Hi Byron,

Can we book some time with you on Friday or Monday?

Let me know your windows of availability and we'll book around it.

Thanks,

---

**Norma Powell, R.P.Bio., ENV SP**  
Senior Project Manager



**Hemmera, an Ausenco Company**  
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## Nutton, Byron

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**From:** Nutton, Byron  
**Sent:** 2019–March-14 4:31 PM  
**To:** Engelsjord, Michael; Magnan, Alain; Rotinsky, Brenda; Hwang, Jason; Cooper, Tola; Bonamis, Alston; Naito, Brian; Pulvermacher, Holly; Benke, Anna  
**Subject:** RE: March 14, 2019 management team meeting

In attendance:

Brenda (chair), Tola, Anna, Brian, Alston, Byron (notes)

Actions:

- previous action item re: LOC still outstanding – **Brenda and Al** to consider proposal
- year-end reminders re: PSPM and budgets – **All** to ensure their teams are on track
- Maplewood Flats – **Byron** to work on developing rationale, Brian offered to be sounding board
- State of the Salmon – **All** to consider nominating a third FPP staff to attend meeting in Nanaimo March 26/27
- Communications – **All** to ensure open lines of communication within their team re: staffing/transition

**From:** Engelsjord, Michael <Michael.Engelsjord@dfo-mpo.gc.ca>  
**Sent:** 2019–March-12 2:37 PM  
**To:** Magnan, Alain <Alain.Magnan@dfo-mpo.gc.ca>; Rotinsky, Brenda <Brenda.Rotinsky@dfo-mpo.gc.ca>; Hwang, Jason <Jason.Hwang@dfo-mpo.gc.ca>; Cooper, Tola <Tola.Cooper@dfo-mpo.gc.ca>; Bonamis, Alston <Alston.Bonamis@dfo-mpo.gc.ca>; Naito, Brian <Brian.Naito@dfo-mpo.gc.ca>; Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>; Pulvermacher, Holly <Holly.Pulvermacher@dfo-mpo.gc.ca>; Benke, Anna <Anna.Benke@dfo-mpo.gc.ca>  
**Subject:** March 14, 2019 management team meeting

I'm not available for the meeting this week. Do we want to proceed with meeting? If so, would someone record action items?

Michael Engelsjord

Team Leader, Fisheries Protection Program / Ecosystem Management Branch  
Fisheries and Oceans Canada / Government of Canada  
[Michael.Engelsjord@dfo-mpo.gc.ca](mailto:Michael.Engelsjord@dfo-mpo.gc.ca) / Tel. : 604-666-2365

Chef d'équipe, Programme de protection des pêches / Direction des écosystèmes  
Pêches et Océans Canada / Gouvernement du Canada  
[Michael.Engelsjord@dfo-mpo.gc.ca](mailto:Michael.Engelsjord@dfo-mpo.gc.ca) / Tél. : 604-666-2365



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**Nutton, Byron**

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**From:** Nutton, Byron  
**Sent:** 2019–March-18 11:34 AM  
**To:** Pulvermacher, Holly  
**Subject:** Fw: Meeting request

Sent from my BlackBerry 10 smartphone on the Rogers network.

**From:** Marko Dekovic <MDekovic@globalterminals.com>  
**Sent:** Friday, March 15, 2019 12:31 PM  
**To:** Nutton, Byron  
**Subject:** RE: Meeting request

Hi Byron,

Thank you for your quick response. Below is a copy of the email received from Kristin as referenced. I look forward to hearing from you as soon as possible on whom we should request a meeting with, as this is of time sensitive matter. We believe information continuing to be shared by VFPA in the media may not be reflective of relevant facts, so our engagement with DFO is paramount to obtain most recent information and relevant guidance. In particular, if VFPA has referred the GCT Deltaport Berth 4 Expansion Preliminary Project Enquiry to DFO for review.

(Media story from yesterday: <https://www.delta-optimist.com/news/t2-complex-no-longer-viable-claims-gct-1.23662701> - "According to the Port of Vancouver, expanding the exiting Deltaport terminal is not an option for a couple of reasons, one being Fisheries and Oceans Canada having prohibited further land reclamation inland from Deltaport.")

Thank you once again in advance for your consideration.

Sincerely,

Marko

**From:** XPAC Referrals Pacific [<mailto:ReferralsPacific@dfo-mpo.gc.ca>]  
**Sent:** March-10-16 1:29 PM  
**To:** [REDACTED]  
**Cc:** Marina Katusa; [REDACTED]  
**Subject:** RE: Request for Review - Deltaport Fourth Berth Expansion project

Hello,

At this time, the Fisheries Protection Program will not be participating in the early planning/pre-environmental assessment of the Deltaport Fourth Berth Expansion. The role of the DFO's Fisheries Protection Program (FPP) is to protect and conserve fish and fish habitat in support of Canada's coastal and inland fisheries resources, and to make regulatory decisions under the fisheries protection provisions of the *Fisheries Act*. The FPP is specifically responsible for reviewing projects for which a s.35(2) *Fisheries Act* Authorization is required.

If you feel that the project proposes works, undertakings or activities that may result in harm to fish or fish habitat, DFO's Projects Near Water website (<http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>) includes information for proponents on how to comply with the Fisheries Act, request a DFO review of a project, and request a *Fisheries Act* authorization.

If you have any further questions about DFO's regulatory process or need general information, contact DFO's Fisheries Protection Program toll free: 1-866-845-6776 or email: [EnquiriesPacific@dfo-mpo.gc.ca](mailto:EnquiriesPacific@dfo-mpo.gc.ca). You can also contact Brenda Rotinsky (A/Team Lead) at 604-666-2365 if you have specific questions about DFO's role at this stage of your Project.

Thank you,

Kristin Singer

Biologist, Fisheries Protection Program  
Fisheries and Oceans Canada/Government of Canada  
[kristin.singer@dfo-mpo.gc.ca](mailto:kristin.singer@dfo-mpo.gc.ca)/Tel: 250 756-7252

La protection des pêches Programme  
Pêches et Océans Canada/Gouvernement du Canada  
[kristin.singer@dfo-mpo.gc.ca](mailto:kristin.singer@dfo-mpo.gc.ca)/Tél: 250 756-7252

Projects Near Water Website: <http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>

---

**From:** Nutton, Byron [mailto:[Byron.Nutton@dfo-mpo.gc.ca](mailto:Byron.Nutton@dfo-mpo.gc.ca)]  
**Sent:** March-13-19 3:14 PM  
**To:** Marko Dekovic  
**Subject:** RE: Meeting request

Hi Marko,

Although do recall hearing about this proposal around the timeframe you have mentioned for your previous engagement with DFO, I do not currently have any involvement in regulatory reviews.

I will enquire with my colleagues as to who is best placed to respond to your request for a meeting. If you are not contacted by the end of next week please let me know and I will follow-up again.

In the meantime, can you please provide me with a copy of the letter from Kristin referenced below. I did a quick search and was unable to find a copy here.

Thanks,

*Byron Nutton, RPBio*

A/Team Lead | Chef d'équipe Intérimaire  
Partnerships, Standards and Guidelines | Partenariats, Normes et lignes directrices  
Fisheries Protection Program | Programme de protection des pêches  
Fisheries and Oceans Canada | Pêches et Océans Canada  
Pacific Region | Région du Pacifique

250-618-4268

**From:** Marko Dekovic <MDekovic@globalterminals.com>  
**Sent:** 2019–March-12 9:46 AM  
**To:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Cc:** Mike McLellan <mmclellan@globalterminals.com>  
**Subject:** Meeting request  
**Importance:** High

Hi Byron,

I am writing on behalf of GCT Canada regarding our proposed GCT Deltaport expansion project.

We have initially reached out to DFO on this topic on February 29<sup>th</sup>, 2016 as outlined in the attached Review Request form. At that time DFO responded (Kristin Singer) on March 10<sup>th</sup>, 2016 stating that “At this time, the Fisheries Protection Program will not be participating in the early planning/pre-environmental assessment of the Deltaport Fourth Berth Expansion.”

Subsequently, we have spent more time refining the project and conducting numerous studies to stress-test the feasibility of the project. Having come to conclusion that our incremental expansion of GCT Deltaport is feasible, we have submitted the attached Preliminary Project Enquiry to the Vancouver Fraser Port Authority Project Environmental Review (PER) process.

Subsequently we have observed VFPA comments in the media that our project is “a non-starter because”:

- “Fisheries and Oceans Canada has prohibited further land reclamation inland from Deltaport” - <https://biv.com/article/2019/03/vancouvers-deltaport-dilemma-terminal-2-or-deltaport-4>

I would like to request a meeting with DFO, as part of our early regulator engagement on our project. At that time GCT would provide an update on the proposed project and its rationale, as well as overview of conducted and proposed studies to address impacts to fish and fish habitat.

Please let me know a time and location at your earliest convenience that could accommodate this meeting and presentation from GCT.

I thank you in advance for your consideration.

Sincerely,

  
**Marko Dekovic**  
Vice President, Public Affairs  
T +1 604 267 5276  
M 

GCT Global Container Terminals Inc.  
Suite 610, The Landing  
375 Water Street  
Vancouver, BC, Canada V6B 5C6  
[globalterminals.com](http://globalterminals.com)

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**of the Access to Information Act  
de la Loi sur l'accès à l'information**

## Nutton, Byron

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**From:** Portail HRG/HRG Portal <EMT.Admin@hrgworldwide.com>  
**Sent:** 2019-March-11 4:07 PM  
**To:** Nutton, Byron  
**Subject:** Action Required - TR Approval

### BYRON NUTTON

A Travel Request has been submitted to you for approval. Please log in to the STS Portal and select Manage Expenses to review.

[Click here for the STS Portal](#)

### Transaction Approval Action Required

The following transaction approval actions are required for the following employees.

Nadine Pinnell - Travel Requests - 01/03/2019 to 31/03/2019

S32 Approval

07/03/2019	BTA 2018-19	\$ 1.00
	BTA 2018-19	
	T525 5B521 310 120 50000 6 - - 0500 N/A 1.00	

## Nutton, Byron

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**From:** Portail HRG/HRG Portal <EMT.Admin@hrgworldwide.com>  
**Sent:** 2019-March-12 4:08 PM  
**To:** Nutton, Byron  
**Subject:** Action Required - TR Approval

### BYRON NUTTON

A Travel Request has been submitted to you for approval. Please log in to the STS Portal and select Manage Expenses to review.

[Click here for the STS Portal](#)

### Transaction Approval Action Required

The following transaction approval actions are required for the following employees.

Nadine Pinnell - Travel Requests - 01/03/2019 to 31/03/2019

S32 Approval

07/03/2019	BTA 2018-19	\$ 1.00
	BTA 2018-19	
	T525 5B521 310 120 50000 6 - - 0500 N/A 1.00	



## Nutton, Byron

---

**From:** Nutton, Byron  
**Sent:** 2019–March-14 8:49 AM  
**To:** Ko, Christina  
**Cc:** Hwang, Jason  
**Subject:** RE: OFFICER: VFPA Habitat Bank Arrangement

If it is supposed to be who wrote the Briefing Note, that would be me. I wasn't sure if that was what was needed, or if it was someone like you who is shepherding it through the process.

**From:** Ko, Christina <Christina.Ko@dfo-mpo.gc.ca>  
**Sent:** 2019–March-14 8:39 AM  
**To:** Hwang, Jason <Jason.Hwang@dfo-mpo.gc.ca>; Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Subject:** OFFICER: VFPA Habitat Bank Arrangement

Good morning Jason and Byron

I'm filling this BN. Who should I put down as the Officer?  
Thanks!

Christina Ko

**From:** Fanos, Brad <Brad.Fanos@dfo-mpo.gc.ca>  
**Sent:** Tuesday, March 12, 2019 2:41 PM  
**To:** Ko, Christina <Christina.Ko@dfo-mpo.gc.ca>  
**Subject:** FW: VFPA Habitat Bank Arrangement

thanks

**From:** Hwang, Jason <Jason.Hwang@dfo-mpo.gc.ca>  
**Sent:** March-12-19 2:40 PM  
**To:** Fanos, Brad <Brad.Fanos@dfo-mpo.gc.ca>  
**Cc:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>; Thorpe, Suzanne <Suzanne.Thorpe@dfo-mpo.gc.ca>  
**Subject:** FW: VFPA Habitat Bank Arrangement

Hi Brad. VFPA package attached in this email. Byron and Suzanne have done a great job keeping this on track and steering towards an outcome that works for everyone. Note the overview comments provided by Byron in the covering email below. If you have questions let us know. Jason

**From:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Sent:** March-12-19 12:42 PM  
**To:** Hwang, Jason <Jason.Hwang@dfo-mpo.gc.ca>  
**Cc:** Thorpe, Suzanne <Suzanne.Thorpe@dfo-mpo.gc.ca>  
**Subject:** VFPA Habitat Bank Arrangement

Jason, as discussed please see the attached updated draft Briefing Note, and "final drafts" of the Arrangement and the Engagement Summary.

The Briefing Note still requires file numbers on page 1, file numbers and additional information in the footer on pages 2-4, and the routing slip (page 5) needs to be completed – my understanding is that Christina Ko can do that stuff.

**Please note that in reference to our engagement with Tsleil-Waututh, in follow-up to our March 5<sup>th</sup> meeting I am expecting written confirmation that they have no outstanding concerns but have drafted the Briefing Note as final in anticipation of receiving that confirmation.**

The copy of the Arrangement is for review and information only – the copy to be signed is making its way through the VFPA sign-off process and will be delivered to Cheryl for final counter signature.

The Engagement Summary Report will be finalized and sent out to the participating Indigenous groups this week – the attached copy is the draft we circulated to participants for comment and to date we have not received any feedback that require changes.

With respect to the discussion points from our Feb 27 meeting with Brad:

- Term of Arrangement and 5-year review: I confirmed that the conditions related to the term and the review (and the entire arrangement overall) are consistent with the template provided in the guidance document. I reviewed the Briefing Note and confirmed that the use of the template is mentioned in the Summary box and again, this time with specific reference to the term and the 5-year review, in the Strategic Considerations section.
- Authorship of Engagement report: I confirmed with VFPA that cover page of final Engagement summary report (to be sent to Indigenous groups this week) will be the same as the final draft version attached, as opposed to being on VFPA letterhead, and I note that joint authorship is confirmed in Section 1: Overview.
- Squamish engagement: I am expecting a summary from VFPA on any additional attempts to engage with Squamish for our records, but it will not affect the outcome/adequacy of the engagement to date.

Let me know if you need anything further.

*Byron Nutton, RPBio*

A/Team Lead | Chef d'équipe Intérimaire

Partnerships, Standards and Guidelines | Partenariats, Normes et lignes directrices

Fisheries Protection Program | Programme de protection des pêches

Fisheries and Oceans Canada | Pêches et Océans Canada

Pacific Region | Région du Pacifique

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## Nutton, Byron

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**From:** Nutton, Byron  
**Sent:** 2019–March-14 9:34 AM  
**To:** Engelsjord, Michael; Magnan, Alain; Rotinsky, Brenda; Hwang, Jason; Cooper, Tola; Bonamis, Alston; Naito, Brian; Pulvermacher, Holly; Benke, Anna  
**Subject:** RE: March 14, 2019 management team meeting

Sorry, that should have read 3:00!

**From:** Nutton, Byron  
**Sent:** 2019–March-14 9:33 AM  
**To:** Engelsjord, Michael <Michael.Engelsjord@dfo-mpo.gc.ca>; Magnan, Alain <Alain.Magnan@dfo-mpo.gc.ca>; Rotinsky, Brenda <Brenda.Rotinsky@dfo-mpo.gc.ca>; Hwang, Jason <Jason.Hwang@dfo-mpo.gc.ca>; Cooper, Tola <Tola.Cooper@dfo-mpo.gc.ca>; Bonamis, Alston <Alston.Bonamis@dfo-mpo.gc.ca>; Naito, Brian <Brian.Naito@dfo-mpo.gc.ca>; Pulvermacher, Holly <Holly.Pulvermacher@dfo-mpo.gc.ca>; Benke, Anna <Anna.Benke@dfo-mpo.gc.ca>  
**Subject:** RE: March 14, 2019 management team meeting

I can record action items.

Mike, can you send out the agenda with any items you've already received plus mine - discussion of Maplewood Flats habitat banking project.

I note that we have an All Staff call at 2:00 so we will need to end a few minutes before that so folks can switch rooms.

**From:** Engelsjord, Michael <Michael.Engelsjord@dfo-mpo.gc.ca>  
**Sent:** 2019–March-12 2:37 PM  
**To:** Magnan, Alain <Alain.Magnan@dfo-mpo.gc.ca>; Rotinsky, Brenda <Brenda.Rotinsky@dfo-mpo.gc.ca>; Hwang, Jason <Jason.Hwang@dfo-mpo.gc.ca>; Cooper, Tola <Tola.Cooper@dfo-mpo.gc.ca>; Bonamis, Alston <Alston.Bonamis@dfo-mpo.gc.ca>; Naito, Brian <Brian.Naito@dfo-mpo.gc.ca>; Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>; Pulvermacher, Holly <Holly.Pulvermacher@dfo-mpo.gc.ca>; Benke, Anna <Anna.Benke@dfo-mpo.gc.ca>  
**Subject:** March 14, 2019 management team meeting

I'm not available for the meeting this week. Do we want to proceed with meeting? If so, would someone record action items?

Michael Engelsjord

Team Leader, Fisheries Protection Program / Ecosystem Management Branch  
Fisheries and Oceans Canada / Government of Canada  
[Michael.Engelsjord@dfo-mpo.gc.ca](mailto:Michael.Engelsjord@dfo-mpo.gc.ca) / Tel. : 604-666-2365

Chef d'équipe, Programme de protection des pêches / Direction des écosystèmes  
Pêches et Océans Canada / Gouvernement du Canada  
[Michael.Engelsjord@dfo-mpo.gc.ca](mailto:Michael.Engelsjord@dfo-mpo.gc.ca) / Tél. : 604-666-2365

## **Nutton, Byron**

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**From:** Nutton, Byron  
**Sent:** 2019–March-14 1:26 PM  
**To:** Joe Walker  
**Subject:** Accepted: RTI Fisheries Act Discussion

## **Nutton, Byron**

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**From:** Nutton, Byron  
**Sent:** 2019–March-14 1:29 PM  
**To:** Runciman, Bruce  
**Subject:** RFCPP Final Reporting call

Hey Bruce. FYI, I can't make the call next Tuesday AM.

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## Nutton, Byron

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**From:** Nutton, Byron  
**Sent:** 2019–March-14 3:50 PM  
**To:** Engelsjord, Michael  
**Subject:** RE: VFPA Maplewood Flats proposed project

The ratio of CEP offsetting to habitat banking, based on area.

**From:** Engelsjord, Michael <Michael.Engelsjord@dfo-mpo.gc.ca>  
**Sent:** 2019–March-14 3:39 PM  
**To:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Subject:** RE: VFPA Maplewood Flats proposed project

Byron,

What do the ratios in the first two bullets under the file summary section refer to?

Mike

**From:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Sent:** Thursday, March 14, 2019 2:46 PM  
**To:** Magnan, Alain <Alain.Magnan@dfo-mpo.gc.ca>  
**Cc:** Engelsjord, Michael <Michael.Engelsjord@dfo-mpo.gc.ca>; Richardson, Tessa <Tessa.Richardson@dfo-mpo.gc.ca>  
**Subject:** FW: VFPA Maplewood Flats proposed project  
**Importance:** High

Hey Al,

FYI due to linkage with Centerm. Mike and Tessa are aware of the overall issue.

Cheers,

Byron

**From:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Sent:** March-14-19 11:14 AM  
**To:** Hwang, Jason <Jason.Hwang@dfo-mpo.gc.ca>; Fanos, Brad <Brad.Fanos@dfo-mpo.gc.ca>  
**Cc:** Thorpe, Suzanne <Suzanne.Thorpe@dfo-mpo.gc.ca>  
**Subject:** VFPA Maplewood Flats proposed project  
**Importance:** High

Hey Jason and Brad,



Sorry for the late notice. Heads up that Suzanne and I have a call with VFPA at 11:30 to discuss their proposed Maplewood Flats habitat banking proposal, and there is a chance they will raise the issue with both or either of you, or perhaps Cheryl.

**Issue:**

- [REDACTED]
- [REDACTED]
- A conference call is scheduled with VFPA later this morning (Thursday, March 14) for DFO to provide high-level first impressions of the proposal submitted on Monday, March 11
- DFO's feedback will be to re-iterate previously communicated [REDACTED]

**Background:**

- Maplewood Flats is a large area of intertidal on the north shore of Burrard inlet, just east of Second Narrows
- Historically a portion of it was excavated out for gravel extraction, creating a basin that was subsequently used for log storage
- The basin is separated from Burrard Inlet by an intertidal "ridge" that allows connectivity at higher tidal levels, but a shallow channel in the southeast also maintain connectivity at broader tidal range
- The northeast portion of the basin is shallow, subtidal mud with relatively low habitat values and proposed enhancements in that area have been accepted as offsetting for CEP

**File Summary:**

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- The habitat banking proposal was finally submitted on Monday, March 11 and as expected VFPA has expressed urgency related to timelines for review and acceptance

## Nutton, Byron

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**From:** Portail HRG/HRG Portal <EMT.Admin@hrgworldwide.com>  
**Sent:** 2019-March-14 4:09 PM  
**To:** Nutton, Byron  
**Subject:** Action Required - TR Approval

### BYRON NUTTON

A Travel Request has been submitted to you for approval. Please log in to the STS Portal and select Manage Expenses to review.

[Click here for the STS Portal](#)

### Transaction Approval Action Required

---

The following transaction approval actions are required for the following employees.

Nadine Pinnell - Travel Requests - 01/03/2019 to 31/03/2019

---

S32 Approval

07/03/2019	BTA 2018-19	\$ 1.00
	BTA 2018-19	
	T525 5B521 310 120 50000 6 - - 0500 N/A 1.00	

## Nutton, Byron

---

**From:** Nutton, Byron  
**Sent:** 2019–March-15 8:58 AM  
**To:** Hwang, Jason  
**Subject:** RE: our call

Sure

**From:** Hwang, Jason <Jason.Hwang@dfo-mpo.gc.ca>  
**Sent:** 2019–March-15 8:54 AM  
**To:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Subject:** our call

Hi Byron – can we move our call to this afternoon? Would 2:00 work?

## Nutton, Byron

---

**From:** Nutton, Byron  
**Sent:** 2019-March-15 9:33 AM  
**To:** Hwang, Jason  
**Subject:** Accepted: standing check in meeting

## Nutton, Byron

---

**From:** Nutton, Byron  
**Sent:** 2019–March-15 9:46 AM  
**To:** Olson, Charlotte  
**Cc:** Ruffo, Gord (Gord.Ruffo@portvancouver.com)  
**Subject:** RE: proposal to use bank credits

Great. That sounds about aright. I will have our reg folks send a simple response that DFO would be open to considering it.

Cheers,

Byron

**From:** Olson, Charlotte <Charlotte.Olson@portvancouver.com>  
**Sent:** 2019–March-15 9:41 AM  
**To:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Cc:** Ruffo, Gord <Gord.Ruffo@portvancouver.com>  
**Subject:** RE: proposal to use bank credits

Hi Byron, we had a very preliminary/exploratory meeting with Joanne Letkeman of MOTI just this week on March 13<sup>th</sup>. She had initiated the meeting to learn about our VFPA Habitat Bank.

We hadn't had time to notify you about this exploratory meeting (as nothing was decided), and I was not aware that she was going to reach out to FPP staff.

I advised her at the meeting that if MOTI was formally interested in pursuing potential credits from VFPA's Habitat Bank, that they were to formally notify VFPA in writing. We have an internal process that we need approval from our Executive first, prior to entering into any kind of credit evaluation – and at that time, we would be notifying our DFO rep (you).

So, she may have jumped the gun, but she probably felt that she needed to know if FPP staff would even consider a potential transaction – prior to formally requesting this to VFPA.

Yes, first MOTI would have to formally submit a request in writing to VFPA (our Executive would have to approve), MOTI would have to evaluate what their requirements were, and if VFPA had relevant credit available – before proceeding to DFO FPP (and us notifying you). I also advised her that MOTI would have to consider any Indigenous engagement requirements if this proceeded (and so would VFPA, and DFO likely).

This might be a good opportunity to test our processes, if MOTI decides to proceed.

I will definitely apprise you as soon as I have a formal request from MOTI. Right now, nothing formal has been submitted.

Thanks,

**Charlotte Olson** P.Geol., PMP

Manager, Infrastructure Habitat Development

CELL: 604.349.4111

**From:** Nutton, Byron [<mailto:Byron.Nutton@dfo-mpo.gc.ca>]

**Sent:** Friday, March 15, 2019 9:32 AM

**To:** Olson, Charlotte <[Charlotte.Olson@portvancouver.com](mailto:Charlotte.Olson@portvancouver.com)>; Ruffo, Gord <[Gord.Ruffo@portvancouver.com](mailto:Gord.Ruffo@portvancouver.com)>

**Subject:** proposal to use bank credits

Hi Charlotte and Gord,

One of our regulatory folks has received an inquiry from BC MOTI about the acceptability of utilizing habitat credits from VFPA's bank to meet some outstanding offsetting requirements.

I think that DFO would be supportive of the approach, but I expect that they would first need to work with VFPA to understand what habitat credits are available before making a specific proposal to DFO.

Does this sound right to you? Have you spoken with anyone from MOTI lately about something like this? If not, can we forward them your contact information?

Thanks,

*Byron Nutton, RPBio*

A/Team Lead | Chef d'équipe Intérimaire

Partnerships, Standards and Guidelines | Partenariats, Normes et lignes directrices

Fisheries Protection Program | Programme de protection des pêches

Fisheries and Oceans Canada | Pêches et Océans Canada

Pacific Region | Région du Pacifique

250-618-4268

**From:** PAC All Staff Message / Message PAC Tout le personnel (DFO/MPO)  
**Sent:** 2019–March-15 9:47 AM  
**To:** DFO.L BC L.MPO - Orig; DFO.L YT L.MPO - Orig; DFO.R PAC CP R.MPO  
**Subject:** Message to All Staff regarding launch of BC Salmon Restoration and Innovation Fund

**Message to All Staff regarding launch of BC Salmon Restoration and Innovation Fund**

Hello everyone,

This morning our Minister and Premier Horgan made an important announcement that launches the BC Salmon Restoration and Innovation Fund (**BCSRIF**). This is a significant investment in BC's fish and seafood sector that was originally announced on November 30, 2018, with preliminary information provided as part of the Fall Economic Statement. However, there are many more exciting details to share as the Fund launches.

Over the past two months, staff on assignment to initiate the BCSRIF have been meeting with various DFO branches and units to spread awareness of the program scope and objectives, while also seeking input on program priorities and potential projects. This work will continue in the coming months, as program development is still ongoing.

The BCSRIF represents a federal-provincial investment of up to \$142.85 million over the next five years. It's goal is to help ensure that BC fisheries are environmentally and economically sustainable for the long-term and resilient to the challenges of climate change and evolving economic conditions. The Fund will also help to protect and restore priority wild BC fish stocks, including Pacific salmon.

This Fund is focused around several key pillars, including Innovation (to encourage new products and technologies), Infrastructure (to encourage capital investments in new products, processes or technologies) and Science Partnerships between industry, academia, and other research institutions. In the coming weeks and months, we will reach out to Indigenous groups and stakeholders, including industry, NGOs and the science and academic communities.

Funding will be available to British Columbia-based commercial and non-commercial organizations, including Indigenous groups, commercial enterprises, universities and academics, and stewardship organizations. Through these collaborations, we will leverage opportunities to ensure the sustainability of BC's fish and seafood sector and support efforts to restore and protect salmon species and other priority fish stocks.

Please help us get the word out by sharing this information with anyone that might be interested in the fund. We appreciate your support to ensure that the program complements existing funding programs and helps to fill any knowledge gaps.

While some discussions have already taken place in the Department internally, staff will be further engaged to ensure that the program is well-supported to achieve its objectives and to avoid overlap with other G&C programs. In the coming days/weeks more information will also become available to staff on opportunities in the BCSRIF program.

In the meantime, please see the attached one pager and [News Release](#) from today's announcement, visit the website <http://bcsrif.ca> contact the BCSRIF team at [DFO.BCSRIF-FRISCB.MPO@dfo-mpo.gc.ca](mailto:DFO.BCSRIF-FRISCB.MPO@dfo-mpo.gc.ca) or call 1-833-615-2379.

Thank you,

## BACKGROUNDER

### British Columbia Salmon Restoration and Innovation Fund (BCSRIF)

The BC Salmon Restoration and Innovation Fund (BCSRIF) is a new initiative jointly funded by Fisheries and Oceans Canada (DFO) and the province of British Columbia (the Province) that was announced in November 2018. DFO and the Province are working together to develop the Fund, which will provide up to \$142M over five years to better protect the health and sustainability of fish stocks, while modernizing the wild fisheries and aquaculture sectors in BC.

The BC Salmon Restoration and Innovation Fund will support the fish and seafood sector in British Columbia to improve the performance and sustainability of the wild capture and aquaculture sectors for long-term environmental and economic sustainability, with a focus on salmon stock protection and restoration. This includes supporting the fish and seafood sector to:

- maximize their harvests
- ensure clean growth and long-term sustainability
- better adapt to changing environmental conditions and impacts
- better adapt to changing economic circumstances
- enable the sector to respond to public and Indigenous concerns regarding sustainability

Similar to the successful Atlantic Fisheries Fund, the BCSRIF will help support projects focused on science partnerships, innovation, and infrastructure investments that improve productivity, sustainability and safety. The Fund will support initiatives for commercial wild capture and aquaculture fisheries, as well as the recreational sector. Although there will be a focus on salmon, activities related to other species will also be eligible.

#### Who is eligible

Eligible recipients must reside in BC, be federally or provincially incorporated, and be active in, or support activities related to BC's fish and seafood harvesting, processing, or aquaculture sectors. This includes commercial enterprises, industry associations, academia, research and innovation institutions, stewardship organizations, and Indigenous organizations or groups.

#### How to apply

BCSRIF is still in development and will be launched late winter 2019. DFO and the Province will be holding information sessions with stakeholders and First Nations in the coming weeks and months to release more details on the Fund and information on how to apply. If interested in receiving information on the BCSRIF launch and outreach events, please send an email to the BCSRIF generic inbox (below).

---

#### BC Salmon Restoration and Innovation Fund

200 – 401 Burrard Street

Vancouver, British Columbia, V6C 3S4

Website: [bcsrif.ca](http://bcsrif.ca)

Email: [DFO.BCSRIF-FRISCB.MPO@dfo-mpo.gc.ca](mailto:DFO.BCSRIF-FRISCB.MPO@dfo-mpo.gc.ca)

Telephone (toll-free): 1-833-615-2379

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[Home](#) > [Fisheries and Oceans Canada](#)

# Governments of Canada and British Columbia now accepting proposals to help restore Pacific salmon and boost the province's fish and seafood sector

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From: [Fisheries and Oceans Canada](#)

## News release

March 15, 2019

**Victoria, BC** - Wild Pacific salmon is integral to the economic and social fabric of coastal communities, and is fundamental to Indigenous communities across British Columbia. The need to act now to protect habitat and restore our wild fish stocks is clear and indeed vital to the environmental and economic sustainability of the province.

Today, the Minister of Fisheries, Oceans and the Canadian Coast Guard, the Honourable Jonathan Wilkinson and BC Premier, the Honourable John Horgan, officially launched the British Columbia Salmon Restoration and Innovation Fund in Victoria. This fund is a federal-provincial collaboration that will help restore the habitat of our wild fish stocks in communities across British Columbia, and the protection

of our vulnerable wild Pacific salmon species. The Government of Canada is investing \$100 million over five years, and the Government of British Columbia is investing \$42.85 million over five years.

It will also support fisheries innovation, science and infrastructure so that BC fish stocks can be harvested sustainably into the future. These investments support the protection of BC's wild fisheries and enhance sustainability in the aquaculture industry.

The fund is now open to proposals from Indigenous groups, conservation groups, commercial organizations in the wild fisheries and industry sectors, recreational fisheries, as well as non-commercial organizations such as universities and academia, industry associations and research institutions. The fund will support projects that leverage local knowledge such as local Indigenous monitoring and guardianship programs and community-led habitat restoration, among other innovative projects aimed at protecting and restoring wild fish stocks.

To be eligible, projects must focus on one or more of the following three areas:

- Innovation – to encourage the development of new technologies to increase productivity and help meet conservation and sustainability objectives, including the protection and restoration of wild BC stocks, including Pacific salmon;
- Infrastructure – to encourage capital investments in new products, processes or technologies to support the advancement of sustainable fishing practices and to support the protection and restoration of wild BC stocks, including Pacific salmon;

- Science partnerships – to support collaborations with academia and other research institutions to improve our knowledge and understanding of impacts to wild stocks and to develop sustainable fishing practices.

The investments from the British Columbia Salmon Restoration and Innovation Fund will ensure BC's wild fisheries are environmentally and economically sustainable for the long-term and that jobs in the fishery are resilient to the challenges of climate change and evolving economic conditions. The fund will help protect and restore priority wild BC fish stocks, including Pacific salmon. Consumers will also benefit from high-quality, sustainably sourced, Canadian fish and seafood products.

To find out more about eligibility, project criteria and how to apply, visit the British Columbia Salmon Restoration and Innovation Fund web page: [bcsrif.ca](https://bcsrif.ca).

## Quotes

"The Government of Canada believes that environmental sustainability and economic growth go together. The new BC Salmon Innovation and Restoration Fund will restore and protect our wild Pacific salmon, while creating more economic opportunities and jobs for the people of British Columbia. I am extremely pleased with the very positive partnership we have developed with the Government of BC in this important area. By working together with the provincial government, conservation groups, scientists and industry we are confident that we can enhance our fisheries and protect our wild fish stocks."

The Honourable Jonathan Wilkinson, Minister of Fisheries, Oceans and the Canadian Coast Guard

"Wild salmon are a part of who we are in this province. Over the past 20 months, our government has been working with First Nations, communities, commercial and recreational fisheries, environmental organizations, and other experts to develop a path forward, towards a sustainable BC fishery that supports wild salmon. By dedicating resources to habitat restoration and salmon runs, this fund will build on that work to make sure wild salmon stocks thrive in BC."

The Honourable John Horgan, Premier of British Columbia

“The BC Salmon Restoration and Innovation Fund demonstrates that the province is taking significant action to support wild salmon stocks and fisheries. We are working in partnership with Fisheries and Oceans Canada to protect the health of wild salmon, and support the First Nations, communities and industries that rely on them.”

The Honourable Lana Popham, Minister of Agriculture

## Quick facts

- The British Columbia Salmon Restoration and Innovation Fund is a 70% federal, 30% provincial cost-shared program.
- The Government of Canada is investing \$100 million over five years for the British Columbia Salmon Restoration and Innovation Fund and will also provide a one-time contribution of \$5 million to the Pacific Salmon Endowment Fund.
- The Government of British Columbia is investing \$42.85 million over five years.
- Salmon are a part of intricate food webs in both their freshwater and marine environments, affecting everything from tiny zooplankton to large mammals like whales, bears and birds of prey.

- Culturally, Chinook is an important species for many BC First Nations. It is also part of the province's long tradition of recreational and sport fishing, which is connected to BC's tourism industry. Commercial fishing also plays a large role in BC's economy.

## Associated links

- [Wild Pacific Salmon get a boost with new Salmon Restoration and Innovation Fund for the province of British Columbia](#)
- [Canada's fisheries funds](#)
- [Pacific Salmon Endowment Fund Society](#)

## Contacts

Jocelyn Lubczuk

Press Secretary

Office of the Minister of Fisheries, Oceans and the Canadian Coast Guard

343-548-7863

[Jocelyn.lubczuk@dfo-mpo.gc.ca](mailto:Jocelyn.lubczuk@dfo-mpo.gc.ca)

Media Relations

Fisheries and Oceans Canada

613-990-7537

[Media.xncr@dfo-mpo.gc.ca](mailto:Media.xncr@dfo-mpo.gc.ca)

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**Date modified:**  
2019-03-15

**Pages 372 to / à 373  
are withheld pursuant to section  
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**19(1)**

**of the Access to Information Act  
de la Loi sur l'accès à l'information**



---

**From:** Nutton, Byron  
**Sent:** 2019–March-15 2:51 PM  
**To:** Barber, Boone  
**Cc:** Thorpe, Suzanne  
**Subject:** RE: Delta 80th Street Water Intake project - 7th year monitoring results

Hi Boone,

As discussed, I understand that BC Ministry of Transportation and Infrastructure (MOTI) are seeking confirmation that DFO would consider the use of existing habitat credits from the Vancouver Fraser Port Authority (VFPA) Habitat Bank to meet outstanding offsetting requirements related to Authorization 02-HPAC-PA2-00314 - Delta Irrigation Enhancement Project (DIEP) 80<sup>th</sup> Street Water Intake.

Further, I understand that:

- [REDACTED]
- [REDACTED]
- [REDACTED]

Even after considering that we are [REDACTED]

I understand that MOTI has already approached VFPA about the concept, but that detailed discussions have yet to take place. [REDACTED]

Please feel free to forward this message to MOTI as confirmation.

Cheers,

Byron

**From:** Barber, Boone <Boone.Barber@dfo-mpo.gc.ca>  
**Sent:** 2019–March-15 9:00 AM  
**To:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Subject:** FW: Delta 80th Street Water Intake project - 7th year monitoring results

Hi Byron,  
When you have a moment I would like to discuss the email below from MOTI regarding purchasing habitat credits from the Port of Vancouver.

Boone

**From:** Letkeman, Joanne TRAN:EX <[Joanne.Letskeman@gov.bc.ca](mailto:Joanne.Letskeman@gov.bc.ca)>  
**Sent:** March-14-19 1:13 PM  
**To:** Wright, Marina <[Marina.Wright@dfo-mpo.gc.ca](mailto:Marina.Wright@dfo-mpo.gc.ca)>  
**Cc:** [REDACTED] Barber, Boone <[Boone.Barber@dfo-mpo.gc.ca](mailto:Boone.Barber@dfo-mpo.gc.ca)>  
**Subject:** RE: Delta 80th Street Water Intake project - 7th year monitoring results

Hello Marina,

We have given this some thought and considered the options. As an alternative to offset the non-functional habitat, we are considering proposing the purchase of equivalent habitat from a habitat bank owned by Port of Vancouver. Is this something that you would consider, provided appropriate criteria were met?

Thank you,  
Joanne

**Joanne M Letkeman, BSc**  
Regional Manager Environmental Services  
Ministry of Transportation and Infrastructure  
Ph: 604 527-2298

**From:** Wright, Marina <[Marina.Wright@dfo-mpo.gc.ca](mailto:Marina.Wright@dfo-mpo.gc.ca)>  
**Sent:** March 13, 2019 1:17 PM  
**To:** Letkeman, Joanne TRAN:EX <[Joanne.Letskeman@gov.bc.ca](mailto:Joanne.Letskeman@gov.bc.ca)>  
**Cc:** [REDACTED] Barber, Boone <[Boone.Barber@dfo-mpo.gc.ca](mailto:Boone.Barber@dfo-mpo.gc.ca)>  
**Subject:** Delta 80th Street Water Intake project - 7th year monitoring results

Dear Joanne and Jim,

As you are aware, Fisheries and Oceans Canada (DFO) issued a Fisheries Act Subsection 35(2) Authorization For Works or Undertakings Affecting Fish Habitat to the BC Ministry of Transportation and Infrastructure (the Ministry) on June 6, 2011 for the harmful alteration, disruption and destruction of fish habitat affecting approximately 2,401 m<sup>2</sup> of fish habitat on the Fraser River. Further, DFO advised the Ministry in our December 7, 2017 letter ( copy attached) of our concerns regarding potential non-compliance with the conditions of the Fisheries Act Authorization.

Thank you for providing DFO with the Year 7 Monitoring Report for the 80th Street Water Intake Project in Delta, BC.

We agree that further consideration is required to determine next steps on this project. From DFO's point of view, the habitat compensation is not functioning as intended. It is the proponent's responsibility to provide DFO with an alternative Habitat Compensation (Offsetting) Plan that accounts for the 570 m<sup>2</sup> of intertidal marsh which was not successfully established (of the original 770 m<sup>2</sup> required in the authorization). When preparing a Compensatory Contingency Plan, DFO recommends that you refer to Schedule 1, Section 13 of the *Applications for Authorization under Paragraph 35(2)(b) of the Fisheries Act Regulations* (<https://laws-lois.justice.gc.ca/eng/regulations/SOR-2013-191/index.html>) and the *Fisheries Productivity Investment Policy: A Proponent's Guide to Offsetting* (<http://www.dfo-mpo.gc.ca/pnw-ppe/offsetting-guide-compensation/index-eng.html>) for guidance on the content of this plan.

If you would like to discuss this project with DFO, please provide three potential dates and times for the teleconference as well as your objective/deliverables for the meeting. I will provide information for DFO's teleconference line once we determine a date. Please indicate if you already have an alternative habitat compensation project in mind.

Best,

Marina

**Marina Wright**

Fisheries Protection Biologist | Biologiste de la protection des pêches,  
Fisheries and Oceans Canada | Pêches et Océans Canada  
3190 Hammond Bay Road, Nanaimo, BC, V9T 6N7  
Office: 250-756-7247  
Email: [marina.wright@dfo-mpo.gc.ca](mailto:marina.wright@dfo-mpo.gc.ca)

**From:** Jim Roberts [REDACTED]

**Sent:** Thursday, January 10, 2019 5:36 PM

**To:** FPP.PAC / PPP.PAC (DFO/MPO) <[ReferralsPacific.XPAC@dfo-mpo.gc.ca](mailto:ReferralsPacific.XPAC@dfo-mpo.gc.ca)>

**Cc:** Letkeman, Joanne TRAN:EX ([Joanne.Letskeman@gov.bc.ca](mailto:Joanne.Letskeman@gov.bc.ca)) <[Joanne.Letskeman@gov.bc.ca](mailto:Joanne.Letskeman@gov.bc.ca)>; [REDACTED]

**Subject:** Delta 80th Street Water Intake project - 7th year monitoring results

To whom it may concern,

Attached, please find a monitoring report documenting the results of the seventh year monitoring for the Delta 80<sup>th</sup> Street Water Intake project, as conducted by [REDACTED] (GL Williams & Associates Ltd) on September 6, 2018. My apologies for the delay in this submission, as it was intended to be submitted in late October of 2018.

The water intake at 80<sup>th</sup> Street in Delta (Delta Intake), including the 80<sup>th</sup> Street Pump Station, was a key component of the Ministry of Transportation and Infrastructure's (MOTI) Delta Irrigation Enhancement Project. Post-construction monitoring was required by Fisheries and Oceans Canada (DFO) Fisheries Act Authorization (No. 11-HPAC-PA2-00314).

The area of compensation marsh required by the DFO authorization (i.e. 770 square metres) has not been met. Discharge of water from the pump station and scour from vessel-generated waves has impacted the growth and establishment of desirable emergent transplant species such as Lyngbye's sedge. The original intention was to extend sedge growth from the western reference marsh upstream to the discharge channel and create a vegetated area of 770 square metres. To the present date, a vegetated area of approximately 200 square metres has become established.

Based on these monitoring results, it is apparent that further discussions are warranted with DFO to negotiate an off-site compensation package. By way of this email and on behalf of MoTI (contact: Joanne Letkeman), I would like to request an opportunity to engage in the necessary follow-up with your office.

Thanks.

Jim

---

**Jim Roberts, B.Sc., R.P.Bio.**  
Senior Fisheries Biologist



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## Nutton, Byron

---

**From:** Nutton, Byron  
**Sent:** 2019–March-15 3:32 PM  
**To:** Hwang, Jason  
**Subject:** approvals

Hey,

As discussed, I just submitted for [REDACTED]

I also slipped in my travel claim for last week.

Cheers,

*Byron Nutton*, RPBio

A/Team Lead | Chef d'équipe Intérimaire  
Partnerships, Standards and Guidelines | Partenariats, Normes et lignes directrices  
Fisheries Protection Program | Programme de protection des pêches  
Fisheries and Oceans Canada | Pêches et Océans Canada  
Pacific Region | Région du Pacifique

250-618-4268

**Pages 379 to / à 380  
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## Nutton, Byron

---

**From:** Portail HRG/HRG Portal <EMT.Admin@hrgworldwide.com>  
**Sent:** 2019-March-15 4:08 PM  
**To:** Nutton, Byron  
**Subject:** Action Required - TR Approval

### BYRON NUTTON

A Travel Request has been submitted to you for approval. Please log in to the STS Portal and select Manage Expenses to review.

[Click here for the STS Portal](#)

### Transaction Approval Action Required

The following transaction approval actions are required for the following employees.

Nadine Pinnell - Travel Requests - 01/03/2019 to 31/03/2019

S32 Approval

07/03/2019	BTA 2018-19	\$ 1.00
	BTA 2018-19	
	T525 5B521 310 120 50000 6 - - 0500 N/A 1.00	

## Nutton, Byron

---

**From:** Portail HRG/HRG Portal <EMT.Admin@hrgworldwide.com>  
**Sent:** 2019-March-16 4:11 PM  
**To:** Nutton, Byron  
**Subject:** Action Required - TR Approval

### BYRON NUTTON

A Travel Request has been submitted to you for approval. Please log in to the STS Portal and select Manage Expenses to review.

[Click here for the STS Portal](#)

### Transaction Approval Action Required

The following transaction approval actions are required for the following employees.

Nadine Pinnell - Travel Requests - 01/03/2019 to 31/03/2019

S32 Approval

07/03/2019	BTA 2018-19	\$ 1.00
	BTA 2018-19	
	T525 5B521 310 120 50000 6 - - 0500 N/A 1.00	



## Nutton, Byron

---

**From:** Runciman, Bruce  
**Sent:** 2019-March-17 12:53 PM  
**To:** Boutillier, Jaclyn  
**Cc:** Nutton, Byron  
**Subject:** RE: For Approval - 16-HPAC-00415 - Upper Bonaparte Streambank Restoration Project  
**Attachments:** 16-HPAC-00415 Report Checklist.v2.docx; 16-HPAC-00415 Report Checklist.v2 - tracked changes.docx; 16-HPAC-00415 - Schedule 7C\_v4.docx; 16-HPAC-00415 - Schedule 7C\_v4 - tracked changes.docx; 16-HPAC-00415 Invoice Summary.v2.xlsx

Hi Jaclyn.

Thanks for your work on this report. I've gone over the information you provided and made minor edits to the checklist Schedule 7C and invoice summary. Edits to the word documents are indicated in the "tracked changes" versions, also attached. Edits to the invoice summary were limited to additional comments and colour theming for previously submitted invoices (with the mandatory progress report). As long as these changes are acceptable and new versions of each document are uploaded to PATH Action ID No. 86, then I recommend Team Leader approval of this reporting package and submission to NHQ for review and payment.

**Byron, can you please confirm that this determination and action are acceptable?**

As always, please let me know if you have any questions or concerns.

Thanks again, Bruce.

PS. I also changed document types in PATH Action ID No. 86 so that the Schedule 7C is "RFCPP - Recipient Report" and the recipient's narrative report is "RFCPP - Recipient Report – Supporting Documents" (instead of the other way around).

**From:** Boutillier, Jaclyn <Jaclyn.Boutillier@dfo-mpo.gc.ca>  
**Sent:** March 7, 2019 10:42 AM  
**To:** Runciman, Bruce <Bruce.Runciman@dfo-mpo.gc.ca>  
**Cc:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Subject:** For Approval - 16-HPAC-00415 - Upper Bonaparte Streambank Restoration Project

Hi Bruce,

Please find attached a Report Checklist, Final Report and all other supporting documents for 16-HPAC-00415 Upper Bonaparte Streambank Restoration Project. All supporting documents are also posted in PATH, **Action Log #86**.

Sufficient information has been provided to justify DFO's acceptance of the group's Annual Report and a payment of: **\$27,404.38**.

Please let me know if you have any further questions or concern.

Thanks,

**Jaclyn Boutillier**

Fisheries Protection Biologist  
Fisheries Protection Program, Ecosystems Management Branch  
Fisheries and Oceans Canada/Government of Canada  
[Jaclyn.Boutillier@dfo-mpo.gc.ca](mailto:Jaclyn.Boutillier@dfo-mpo.gc.ca)/Tel: 250 756-7263

Programme de protection des pêches, Gestion des écosystèmes  
Pêches et Océans Canada/Gouvernement du Canada  
[Jaclyn.Boutillier@dfo-mpo.gc.ca](mailto:Jaclyn.Boutillier@dfo-mpo.gc.ca)/Tel: 250-756-7263

## RECREATIONAL FISHERIES CONSERVATION PARTNERSHIPS PROGRAM

### Regional Checklist for Reviewing Recipient Reports

<b>Path #:</b>	16-HPAC-00415
<b>Project Title:</b>	Upper Bonaparte Streambank Restoration Project, 2016-2018
<b>Proponent Name:</b>	British Columbia Conservation Foundation
<b>Recommended Payment Amount:</b>	\$27,404.38
<b>Date:</b>	March 7 <sup>th</sup> , 2019

### CHECKLIST

CHECKLIST

Action	
<b>Schedule 7 - General</b>	
1. Schedule 7 matches the one in the signed CA and all sections have been duly filled in.	√*
2. Reporting period: a. Where this is the first report submitted by a recipient under the CA, the reporting period commences on the day that RFCPP-funded activities first started taking place. b. Where a previous report has been submitted by the recipient under the CA, the reporting period for this report commences the day after the end of the previous reporting period.	√*
<b>Schedule 7 – Section 1</b>	
3. The “RFCPP funds received year to date” matches the amount in RFCPP records.	√
4. Amounts in Table 1.1 are summed correctly.	√
5. Claimed expenses for expense categories tagged with an asterisk (*) do not exceed the budgeted amount.	n/a
6. The amounts reported in Table 1.1 raise no raise red flags and align with the timing of Activities in Schedule 5 and the reporting period.	√*
7. Reimbursable taxes have not been claimed (see application form for percentages reimbursable).	√*
8. Table 1.2 has been filled in where budgeted amounts exceed the allowed deviation: a. If the deviation was previously approved by DFO: no action required. b. If the deviation was not previously approved by DFO: review the reason for the deviation and recommend to NHQ (when submitting the report for payment) whether or not the over-expenditure(s) should be reimbursed. Whether the over-expenditures are reimbursed or not, the recipient must be informed that as per the CA (Sch. 5 s. 6.3) requests for budget reallocations in excess of the set percentage must be submitted to DFO prior to deviating from planned expenditures.	n/a
9. Confirmation letters for all previously unconfirmed cash support and large in-kind support have been received and posted to PATH (applies to multi-year agreements with supplemental conditions for unconfirmed support).	√*
10. Support received matches what was detailed in the CA. If different, then no effect on federal and stacking limits has been confirmed.	√*
11. All financial information has been entered in the ‘Actual’ section of the financial tab in PATH.	√
<b>Schedule 7 – Section 2</b>	
12. The status of deliverables matches the claimed expenses and timing of Activities in Schedule 5.	√
13. Where invoices were provided as deliverables, the total(s) of the invoices match what is reported/claimed in Section 1, Table 1.1.	√
14. The quality/level of detail of the deliverables provided is sufficient to recommend payment under s. 34 of the <i>Financial Administration Act</i> (i.e., sufficient information has been provided to justify payment).	√

15. Where Table 2.2 has been filled in:	
<ul style="list-style-type: none"> <li>a. Determine whether the explanation may impact the payment amount being requested by the recipient - address with NHQ when submitting the report for payment.</li> <li>b. Determine whether an amendment may be required – address with NHQ when submitting the report for payment (does not apply to final reports).</li> <li>c. Determine whether as a result of cancelled/delayed activities the stacking limit may be exceeded. If so, the recipient must confirm the actual amounts received from other sources. If the stacking limit was/will be exceeded, the RFCPP recommended payment must be reduced accordingly to ensure that the stacking limit is met.</li> </ul>	n/a
16. RFCPP signage follows the RFCPP-FIP Guidelines.	*
<b>Schedule 7 – Section 3</b>	
17. The “actuals” in Table 3.1 align with the activities and budget table.	√*
18. All capital acquisitions purchased have been included in Table 3.2 (and align with the costs identified in the budget table).	n/a
19. All information provided in Section 3 has been recorded in PATH (for final/annual reports only).	√
<b>Schedule 7 – Section 4</b>	
20. Section 4 has been signed by an authorised representative of the Recipient (does not need to be the CA signatory).	√
<b>Regional Approval</b>	
21. Schedule 7 and all supporting documents (e.g., deliverables) have been posted to PATH.	√*
22. If a multi-year agreement, Schedule 6 for next year has been received and posted to PATH.	n/a
23. If a site visit was completed for the CA, a summary thereof is provided in the comments section below.	n/a
24. The Team Leader has reviewed and approved the recipient report and recommends payment.	√

#### COMMENTS:

1. Minor edits, errors and omissions corrected and highlighted per RFCPP guidance.
2. A mandatory progress report was received covering the period of April 1, 2018 to September 30, 2018 (see PATH Action Log No. 79), but no supporting deliverables beyond invoices were provided and no reimbursement was requested.
6. Amounts reported in Table 1.1 are almost identical to budgeted amounts, but this is not greatly surprising because all expenses except project management by the recipient were split between RFCPP and other sources of support.
7. See “16-HPAC-00415 Invoice Summary.v2.xlsx”. Where applicable, recipient claimed 50% GST for reimbursable taxes.
9. For the previously unconfirmed \$46,975 cash funding provided by the Pacific Salmon Foundation, see PATH Action Log No. 86.
10. Federal stacking limits have been met; however, in-kind support from the landowner was not confirmed for this year, therefore, it was removed from the year-end totals (see PATH Action Log No. 90).
13. See comment 7, above.
16. There is no requirement for project signage to be installed during 2018-19.
17. More in-stream restoration was achieved than expected (1,680 m<sup>2</sup> vs. 1,510m<sup>2</sup>).
21. See PATH Action ID No. 86.

### **CALCULATIONS FOR RECOMMENDED PAYMENT:**

Total 2018-19 agreement amount:	\$109,622.00
Payments requisitioned to date:	\$82,217.00 (initial advance)
Recipient eligible expenses reported on:	\$109,621.38
Amount eligible for reimbursement:	\$27,404.38 (total agreement amount, less payments to date)
Less 10% holdback:	N/A
<b>Recommended reimbursement payment amount:</b>	<b>\$27,404.38</b>

## RECREATIONAL FISHERIES CONSERVATION PARTNERSHIPS PROGRAM

### Regional Checklist for Reviewing Recipient Reports

<b>Path #:</b>	16-HPAC-00415
<b>Project Title:</b>	Upper Bonaparte Streambank Restoration Project, 2016-2018
<b>Proponent Name:</b>	British Columbia Conservation Foundation
<b>Recommended Payment Amount:</b>	\$27,404.38
<b>Date:</b>	March 7 <sup>th</sup> , 2019

#### CHECKLIST

Action	√
<b>Schedule 7 - General</b>	
1. Schedule 7 matches the one in the signed CA and all sections have been duly filled in.	√*
2. Reporting period:	
a. Where this is the first report submitted by a recipient under the CA, the reporting period commences on the day that RFCPP-funded activities first started taking place.	√*
b. Where a previous report has been submitted by the recipient under the CA, the reporting period for this report commences the day after the end of the previous reporting period.	
<b>Schedule 7 – Section 1</b>	
3. The “RFCPP funds received year to date” matches the amount in RFCPP records.	√*
4. Amounts in Table 1.1 are summed correctly.	√
5. Claimed expenses for expense categories tagged with an asterisk (*) do not exceed the budgeted amount.	√n/a
6. The amounts reported in Table 1.1 raise no red flags and align with the timing of Activities in Schedule 5 and the reporting period.	√*
7. Reimbursable taxes have not been claimed (see application form for percentages reimbursable).	√*
8. Table 1.2 has been filled in where budgeted amounts exceed the allowed deviation:	
a. If the deviation was previously approved by DFO: no action required.	
b. If the deviation was not previously approved by DFO: review the reason for the deviation and recommend to NHQ (when submitting the report for payment) whether or not the over-expenditure(s) should be reimbursed. Whether the over-expenditures are reimbursed or not, the recipient must be informed that as per the CA (Sch. 5 s. 6.3) requests for budget reallocations in excess of the set percentage must be submitted to DFO prior to deviating from planned expenditures.	n/a
9. Confirmation letters for all previously unconfirmed cash support and large in-kind support have been received and posted to PATH (applies to multi-year agreements with supplemental conditions for unconfirmed support).	√*
10. Support received matches what was detailed in the CA. If different, then no effect on federal and stacking limits has been confirmed.	√*
11. All financial information has been entered in the ‘Actual’ section of the financial tab in PATH.	√
<b>Schedule 7 – Section 2</b>	
12. The status of deliverables matches the claimed expenses and timing of Activities in Schedule 5.	√
13. Where invoices were provided as deliverables, the total(s) of the invoices match what is reported/claimed in Section 1, Table 1.1.	√

14. The quality/level of detail of the deliverables provided is sufficient to recommend payment under s. 34 of the <i>Financial Administration Act</i> (i.e., sufficient information has been provided to justify payment).	√
15. Where Table 2.2 has been filled in: <ul style="list-style-type: none"> <li>a. Determine whether the explanation may impact the payment amount being requested by the recipient - address with NHQ when submitting the report for payment.</li> <li>b. Determine whether an amendment may be required – address with NHQ when submitting the report for payment (does not apply to final reports).</li> <li>c. Determine whether as a result of cancelled/delayed activities the stacking limit may be exceeded. If so, the recipient must confirm the actual amounts received from other sources. If the stacking limit was/will be exceeded, the RFCPP recommended payment must be reduced accordingly to ensure that the stacking limit is met.</li> </ul>	n/a
16. RFCPP signage follows the RFCPP-FIP Guidelines.	√**
<b>Schedule 7 – Section 3</b>	
17. The “actuals” in Table 3.1 align with the activities and budget table.	√*
18. All capital acquisitions purchased have been included in Table 3.2 (and align with the costs identified in the budget table).	n/a
19. All information provided in Section 3 has been recorded in PATH (for final/annual reports only).	√
<b>Schedule 7 – Section 4</b>	
20. Section 4 has been signed by an authorised representative of the Recipient (does not need to be the CA signatory).	√
<b>Regional Approval</b>	
21. Schedule 7 and all supporting documents (e.g., deliverables) have been posted to PATH.	√*
22. If a multi-year agreement, Schedule 6 for next year has been received and posted to PATH.	n/a
23. If a site visit was completed for the CA, a summary thereof is provided in the comments section below.	n/a
24. The Team Leader has reviewed and approved the recipient report and recommends payment.	√

## COMMENTS:

1. Minor edits, errors and omissions corrected and highlighted per RFCPP guidance.
- ~~2. Minor change to reflect reporting period commencing the day after the end of the previous reporting period.~~ 2. A mandatory progress report was received covering the period of April 1, 2018 to September 30, 2018 (see PATH Action Log No. 79), ~~yet~~ but no supporting deliverables ~~or beyond invoices were provided and no~~ reimbursement was requested.
- ~~3. Minor typo – changed to reflect RFCPP funds received to date.~~
6. Amounts reported in Table 1.1 are almost identical to budgeted amounts, but this is not greatly surprising because all expenses except project management by the recipient were split between RFCPP and other sources of support.
7. See “16-HPAC-00415 Invoice Summary.v2.xlsx”. Where applicable, recipient claimed 50% GST for reimbursable taxes.
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13. See comment 7, above.
16. There is no requirement for project signage to be installed during 2018-19.
17. More in-stream restoration was achieved than expected (1,680 m<sup>2</sup> vs. 1,510m<sup>2</sup>).
21. See PATH Action ID No. 86.

|



### **CALCULATIONS FOR RECOMMENDED PAYMENT:**

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Payments requisitioned to date:	\$82,217.00 (initial advance)
Recipient eligible expenses reported on:	\$109,621.38
Amount eligible for reimbursement:	\$27,404.38 (total agreement amount, less payments to date)
Less 10% holdback:	N/A
<b>Recommended reimbursement payment amount:</b>	<b>\$27,404.38</b>

## SCHEDULE 7C

### PROGRESS REPORT / YEAR-END REPORT

#### Recreational Fisheries Conservation Partnerships Program

<b>Fiscal Year:</b>	2018-19
<b>Agreement Number:</b>	16-HPAC-00415
<b>Name and Address of Recipient:</b>	British Columbia Conservation Foundation 1B-1445 McGill Road Kamloops, British Columbia V2C 6K7
<b>Amount of Approved Contribution:</b>	\$109,622

**Reporting period:** from: October 1, 2018 to March 31, 2019

<b>Type of report:</b>	<b>Purpose of report:</b>
<input type="checkbox"/> Progress Report	<input type="checkbox"/> Request for advance payment
<input type="checkbox"/> Year-end Report	<input checked="" type="checkbox"/> Request for reimbursement
<input checked="" type="checkbox"/> Final Report	<input checked="" type="checkbox"/> Release holdback

### Section 1 – Financial Summary

RFCPP funds received year to date: \$82,217 All highlighted edits by DFO

**Table 1.1: RFCPP Budget 2018-19**  
Fill in the last five columns. Do not alter the information in the first three columns.

Expense category	Expense description	RFCPP planned budget, including taxes reimbursable by the RFCPP*	Actual RFCPP expenses for current reporting period	Actual RFCPP expenses April 1, 2018 to end of current reporting period	Planned RFCPP expenses for next reporting period (if applicable)
Activity 1.0 Contract or professional service costs	Habitat structure installation:  RFCPP portion: 15 structures @ \$4,305/structure = \$64,575  (rate includes 2.5% unrecoverable GST)	\$64,575	\$38,745	\$64,575	\$0
Activity 1.3 Contract or professional service costs	Construction and installation of 45 rock toe sections between habitat structures:  RFCPP portion: 21 structures @ \$861/structure = \$18,081  (cash rate includes 2.5% unrecoverable GST)	\$18,081	\$18,081	\$18,081	\$0
Activity 1.4 Contract or professional service costs	Riparian planting (1-20 cuttings per linear meter):  RFCPP portion: 65 linear metres @ \$31.78/linear meter = \$2,066  (rate includes 2.5% unrecoverable GST)	\$2,066	\$2,065.38	\$2,065.38	\$0

Activity 1.6 Contract or professional service costs	Project management and support by the BC Conservation Foundation:  RFCPP: 36 days Project Manager @ \$350/day = \$12,600	\$12,600	\$12,600.00	\$12,600.00	\$0
Activity 1.7 Contract or professional service costs	Prescription development, site supervision and reporting by professional biologist:  RFCPP portion: 8 days @ \$1,537.50/day (incl. travel and accommodation**) = \$12,300 (rate includes 2.5% unrecoverable GST)	\$12,300	\$5,381.25	\$12,300	\$0
<b>Total</b>		\$109,622	<del>\$76,872.62</del> \$76,872.63	\$109,621.38	\$0

\* The RFCPP can only reimburse GST/HST that is not reimbursable by Canada Revenue Agency and PST not reimbursable by the provinces.

\*\* Note that kilometric-based vehicle rates must align with those of the National Joint Council (NJC) in order to be reimbursed by the RFCPP; the current NJC kilometric rate for BC is 47.5 cents/km (see <http://www.njc-cnm.gc.ca/directive/travel-voyage/td-dv-a2-eng.php>).

#### Table 1.2: Budget Deviations

Progress reports: Where the 'Expenses year to date' have exceeded the RFCPP budget by 10% for a given expense category, please provide an explanation. Add rows as required.

Year-end reports: Where the 'Expenses year to date' have deviated above or below the RFCPP budget by 10% for a given expense category, please provide an explanation. Add rows as required.

Expense category	RFCPP budget	Expenses year to date	Under- or Over-budget amount	Reason for budget deviation

#### Table 1.3: Other Sources of Support for 2018-19 (for year-end and final reports only)

Indicate the amounts received from other sources of support in the appropriate column. Add rows as required.

a) Organization Name, Description of activities to be funded and Valuation of Support	b) \$ Value federal cash support	c) \$ Value provincial/municipal cash support	d) \$ Value other cash support	e) \$ Value in-kind support	f) Total \$ Support
DFO (RRU)				\$9,900	\$9,900
WEA (Wallis Environmental Aquatics)				\$83,178	\$83,178
PSF (Pacific Salmon Foundation)			\$46,945		\$46,945
<b>Sub-total</b>			\$46,945	\$93,078	\$140,023
<b>Total 2016-18 (from Schedule 7B, Table 1.3)</b>			\$47,000	\$277,717	\$324,717
<b>Project Total 2016-19</b>			<b>\$93,945</b>	<b>\$370,795</b>	<b>\$464,740</b>

## Section 2 – Deliverables

**Table 2.1**

Activities and Associated Deliverables	Status of Activity
<b>Activity 1: Restoration work Year 3</b>  <b>Deliverables to provide to DFO:</b> 1. Final report that includes a written description of the works undertaken as well as annotated photo documentation of all restoration activities showing the works before, during and after completion. 2. Copies of paid invoices for contract and professional service costs funded by RFCPP *  * Note: invoices should correspond to the Schedule 5, Section 4, budget section of this agreement, the RFCPP portion of paid expenses should be noted on the invoice, and 50% of GST paid should be deducted from the total invoice amount per federal tax reimbursement benefits.	<input checked="" type="checkbox"/> Complete (submit deliverables with report) <input type="checkbox"/> Complete (final deliverables submitted with a previous report) <input type="checkbox"/> In progress (submit draft deliverables with report) <input type="checkbox"/> Cancelled (provide explanation in table 2.2) <input type="checkbox"/> Delayed (provide explanation in table 2.2) <input type="checkbox"/> Not started (i.e., reporting period prior to activity start date)

**Table 2.2**

For any Activity that was cancelled or delayed, please provide an explanation. Add rows as required.

Activity	Explanation for cancellation/delay

**Table 2.3**

For any activity that required an authorization, please identify the activity, and list the corresponding authorization type, number, and issuing authority. Submit a copy of the authorization to DFO along with the Report. Add rows as required.

Agreement Activity #	Authorization Type	Authorization #	Issuing Authority
Activity 1: Restoration work Year 3	Section 11	100176368	<b>Mark Philippotts R.P. Bio.</b> Ecosystems Biologist/Habitat Officer MFLNRORD 1259 Dalhousie Drive Kamloops, B.C. V2C 5Z5

**Table 2.4**

Complete this table if any public/media events were organized, or if any public communications (including but not limited to websites, publications, news releases, presentations, reports, advertising, paid announcements and expositions) were undertaken, as related to the Activities of this Agreement. Add rows as required.

Type of Communication (e.g. media/public event, newspaper, newsletter, magazine article, blog)	Communication Details (e.g. title, distribution size, number of participants)	Date of Communication	Web Link (if not posted to the Web, submit a copy with report)

## Section 3 –Measuring Program Performance

**Table 3.1 (for year-end reports only)**

Enter actual amounts in the last column.

Performance Measure		Planned	Actual
Number of partners (organizations) providing cash and/or in-kind support to project (the Recipient and DFO must not be counted as partners):		3	3
Number of volunteers (individuals) working on RFCPP-funded activities:		11	12
Number of people paid using RFCPP funding:		6	7
Shoreline Works	Floodplain and wetland restoration (square metres)		
	Riparian plantings functional for fish (linear metres of shoreline (if the opposing shorelines both received riparian treatment, enter the cumulative linear measure of shoreline))		
	Shoreline stabilization (linear metres of shoreline (if the opposing shorelines are both stabilized, enter the cumulative linear measure of shoreline))		
Instream Restoration	Restoration of spawning grounds (square metres)		
	Artificial reefs (square metres)		
	Removal of dam or other significant anthropogenic structure (square metres – footprint of structure)		
	Over-wintering habitat (square metres)		
	General in-water fish habitat improvement such as, but not limited to, pool and riffle management, channel bypass, rearing and habitat complexing (e.g., installation of large wood debris/ rock) or removal of nuisance vegetation and debris (square metres of channel reach restored)	1,510 m <sup>2</sup>	1,680 m <sup>2</sup>
Fish Passage	Enhancement of fish passage conditions (Linear metres of accessible upstream habitat)		
Chemical Manipulation	Improvements of water quality (e.g., aeration or liming) (square metres)		

**Table 3.2**

List all capital acquisitions purchased using RFCPP funding (\$1,000 or more per individual item). Add rows as required.

Item and description	Cost
1.	
2.	
3.	

s.19(1)

## Section 4 - Confirmation

I hereby confirm that the information provided in this report, including all attachments, is accurate to the best of my knowledge and that I am authorized to sign this report on behalf of the Recipient.

### Option 1: Hard copy signature

Name: \_\_\_\_\_

Position: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

### Option 2: Electronic – check box

☒ I have read and agree with the above statements

Name:  \_\_\_\_\_

Position: BCCF Project Coordinator \_\_\_\_\_ Date: March 2, 2019 \_\_\_\_\_

## SCHEDULE 7C

### PROGRESS REPORT / YEAR-END REPORT

#### Recreational Fisheries Conservation Partnerships Program

<b>Fiscal Year:</b>	2018-19
<b>Agreement Number:</b>	16-HPAC-00415
<b>Name and Address of Recipient:</b>	British Columbia Conservation Foundation 1B-1445 McGill Road Kamloops, British Columbia V2C 6K7
<b>Amount of Approved Contribution:</b>	\$109,622

Reporting period: from: October 1, 2018 to March 31, 2019

<b>Type of report:</b>	<b>Purpose of report:</b>
<input type="checkbox"/> Progress Report	<input type="checkbox"/> Request for advance payment
<input type="checkbox"/> Year-end Report	<input checked="" type="checkbox"/> Request for reimbursement
<input checked="" type="checkbox"/> Final Report	<input checked="" type="checkbox"/> Release holdback

### Section 1 – Financial Summary

RFCPP funds received year to date: \$82,217 [All highlighted edits by DFO](#)

**Table 1.1: RFCPP Budget 2018-19**  
Fill in the last five columns. Do not alter the information in the first three columns.

Expense category	Expense description	RFCPP planned budget, including taxes reimbursable by the RFCPP*	Actual RFCPP expenses for current reporting period	Actual RFCPP expenses April 1, 2018 to end of current reporting period	Planned RFCPP expenses for next reporting period (if applicable)
Activity 1.0 Contract or professional service costs	Habitat structure installation:  RFCPP portion: 15 structures @ \$4,305/structure = \$64,575  (rate includes 2.5% unrecoverable GST)	\$64,575	\$38,745	\$64,575	\$0
Activity 1.3 Contract or professional service costs	Construction and installation of 45 rock toe sections between habitat structures:  RFCPP portion: 21 structures @ \$861/structure = \$18,081  (cash rate includes 2.5% unrecoverable GST)	\$18,081	\$18,081	\$18,081	\$0
Activity 1.4 Contract or professional service costs	Riparian planting (1-20 cuttings per linear meter):  RFCPP portion: 65 linear metres @ \$31.78/linear meter = \$2,066  (rate includes 2.5% unrecoverable GST)	\$2,066	\$2,065.38	\$2,065.38	\$0

Activity 1.6 Contract or professional service costs	Project management and support by the BC Conservation Foundation:  RFCPP: 36 days Project Manager @ \$350/day = \$12,600	\$12,600	\$12,600.00	\$12,600.00	\$0
Activity 1.7 Contract or professional service costs	Prescription development, site supervision and reporting by professional biologist:  RFCPP portion: 8 days @ \$1,537.50/day (incl. travel and accommodation**) = \$12,300 (rate includes 2.5% unrecoverable GST)	\$12,300	\$5,381.25	\$12,300	\$0
<b>Total</b>		\$109,622	<del>\$76,872.62</del> \$76,872.63	\$109,621.38	\$0

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\* The RFCPP can only reimburse GST/HST that is not reimbursable by Canada Revenue Agency and PST not reimbursable by the provinces.

\*\* Note that kilometer-based vehicle rates must align with those of the National Joint Council (NJC) in order to be reimbursed by the RFCPP; the current NJC kilometer rate for BC is 47.5 cents/km (see <http://www.njc-cnm.gc.ca/directive/travel-voyage/td-dv-a2-eng.php>).

#### Table 1.2: Budget Deviations

**Progress reports:** Where the 'Expenses year to date' have exceeded the RFCPP budget by 10% for a given expense category, please provide an explanation. Add rows as required.

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Expense category	RFCPP budget	Expenses year to date	Under- or Over-budget amount	Reason for budget deviation

#### Table 1.3: Other Sources of Support for 2018-19 (for year-end and final reports only)

Indicate the amounts received from other sources of support in the appropriate column. Add rows as required.

a) Organization Name, Description of activities to be funded and Valuation of Support	b) \$ Value federal cash support	c) \$ Value provincial/municipal cash support	d) \$ Value other cash support	e) \$ Value in-kind support	f) Total \$ Support
DFO (RRU)				\$9,900	\$9,900
WEA (Wallis Environmental Aquatics)				\$83,178	\$83,178
PSF (Pacific Salmon Foundation)			\$46,945		\$46,945
Sub-total			\$46,945	\$93,078	\$140,023
Total 2016-18 (from Schedule 7B, Table 1.3)			\$47,000	\$277,717	\$324,717
Project Total 2016-19			\$93,945	\$370,795	\$464,740



## Section 2 – Deliverables

Table 2.1

Activities and Associated Deliverables	Status of Activity
<b>Activity 1: Restoration work Year 3</b>  <b>Deliverables to provide to DFO:</b> 1. Final report that includes a written description of the works undertaken as well as annotated photo documentation of all restoration activities showing the works before, during and after completion. 2. Copies of paid invoices for contract and professional service costs funded by RFCPP *  * Note: invoices should correspond to the Schedule 5, Section 4, budget section of this agreement, the RFCPP portion of paid expenses should be noted on the invoice, and 50% of GST paid should be deducted from the total invoice amount per federal tax reimbursement benefits.	<input checked="" type="checkbox"/> Complete (submit deliverables with report) <input type="checkbox"/> Complete (final deliverables submitted with a previous report) <input type="checkbox"/> In progress (submit draft deliverables with report) <input type="checkbox"/> Cancelled (provide explanation in table 2.2) <input type="checkbox"/> Delayed (provide explanation in table 2.2) <input type="checkbox"/> Not started (i.e., reporting period prior to activity start date)

Table 2.2

For any Activity that was cancelled or delayed, please provide an explanation. Add rows as required.

Activity	Explanation for cancellation/delay

Table 2.3

For any activity that required an authorization, please identify the activity, and list the corresponding authorization type, number, and issuing authority. Submit a copy of the authorization to DFO along with the Report. Add rows as required.

Agreement Activity #	Authorization Type	Authorization #	Issuing Authority
Activity 1: Restoration work Year 3	Section 11	100176368	Mark Phillpotts R.P. Bio. Ecosystems Biologist/Habitat Officer MFLNRD 1259 Dalhousie Drive Kamloops, B.C. V2C 5Z5

Table 2.4

Complete this table if any public/media events were organized, or if any public communications (including but not limited to websites, publications, news releases, presentations, reports, advertising, paid announcements and expositions) were undertaken, as related to the Activities of this Agreement. Add rows as required.

Type of Communication (e.g. media/public event, newspaper, newsletter, magazine article, blog)	Communication Details (e.g. title, distribution size, number of participants)	Date of Communication	Web Link (if not posted to the Web, submit a copy with report)

### Section 3 –Measuring Program Performance

**Table 3.1 (for year-end reports only)**

Enter actual amounts in the last column.

Performance Measure		Planned	Actual
Number of partners (organizations) providing cash and/or in-kind support to project (the Recipient and DFO must not be counted as partners):		3	3
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Number of people paid using RFCPP funding:		6	7
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	Riparian plantings functional for fish (linear metres of shoreline (if the opposing shorelines both received riparian treatment, enter the cumulative linear measure of shoreline))		
	Shoreline stabilization (linear metres of shoreline (if the opposing shorelines are both stabilized, enter the cumulative linear measure of shoreline))		
Instream Restoration	Restoration of spawning grounds (square metres)		
	Artificial reefs (square metres)		
	Removal of dam or other significant anthropogenic structure (square metres – footprint of structure)		
	Over-wintering habitat (square metres)		
	General in-water fish habitat improvement such as, but not limited to, pool and riffle management, channel bypass, rearing and habitat complexing (e.g., installation of large wood debris/ rock) or removal of nuisance vegetation and debris (square metres of channel reach restored)	1,510 m <sup>2</sup>	1,680 m <sup>2</sup>
Fish Passage	Enhancement of fish passage conditions (Linear metres of accessible upstream habitat)		
Chemical Manipulation	Improvements of water quality (e.g., aeration or liming) (square metres)		

**Table 3.2**

List all capital acquisitions purchased using RFCPP funding (\$1,000 or more per individual item). Add rows as required.

Item and description	Cost
1.	
2.	
3.	

#### Section 4 - Confirmation

I hereby confirm that the information provided in this report, including all attachments, is accurate to the best of my knowledge and that I am authorized to sign this report on behalf of the Recipient.

##### Option 1: Hard copy signature

Name: \_\_\_\_\_

Position: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

##### Option 2: Electronic – check box

☒ I have read and agree with the above statements

Name: Barb Waters \_\_\_\_\_

Position: BCCF Project Coordinator \_\_\_\_\_ Date: March 2, 2019 \_\_\_\_\_

# RFCPP Report Invoice Summary

Project Title: PATH No:		Upper Bonaparte Streambank Restoration Project, 2016-2018 16-HPAC 00413		% GST Rate: % PST Rate:		% GST NOT Reimbursable by CRA: % PST NOT Reimbursable by Province:		50.00% 100.00%	
Expense Category	Expense Description	Invoice Date	Invoice Identifier # & Supplier	Invoice Amt (excluding taxes & MERCs)	RFCPP Eligible Expense (excluding taxes & MERCs)	RFCPP Eligible Taxes & MERCs	RFCPP Total Eligible Expense (including taxes & MERCs)	Final Total for Expense Category	
Contract and Professional Services	Professional biologists (1.5 days @ \$1,500/day)	25 Feb. 19	WEA 973 - Wallis Environmental Aquatics Ltd	\$2,250.00	\$2,250.00	\$56.25	\$2,306.25		
	Professional biologists (12 days @ \$1,500/day)	9 Oct. 18	WEA 960 - Wallis Environmental Aquatics Ltd	\$60,455.00	\$3,300.00	\$75.00	\$3,075.00		
	Habitat structures (9 structures @ \$4,200/structure)	9 Oct. 18	WEA 960 - Wallis Environmental Aquatics Ltd	\$60,455.00	\$17,400.00	\$945.00	\$38,745.00		
	Rock topos (12m @ \$540/m)	9 Oct. 18	WEA 960 - Wallis Environmental Aquatics Ltd	\$60,455.00	\$17,440.00	\$441.00	\$18,081.00		
	Riparian plantings (65m @ \$31/m)	9 Oct. 18	WEA 960 - Wallis Environmental Aquatics Ltd	\$60,455.00	\$2,015.00	\$50.18	\$2,065.18		
	Riparian plantings (45m @ \$44/m @ \$1,500/day)	25 Feb. 19	WEA 973 - Wallis Environmental Aquatics Ltd	\$15,750.00	\$5,500.00	\$168.75	\$5,918.75		
	Habitat management (136 days @ \$500/day)	25 Feb. 19	WEA 973 - Wallis Environmental Aquatics Ltd	\$15,750.00	\$5,500.00	\$168.75	\$5,918.75		
Project management (136 days @ \$150/day)				\$12,600.00	\$12,600.00	\$0.00	\$12,600.00		
TOTAL CLAIMING UNDER RFCPP								\$109,621.38	

Notes:

Agreement Amt:	\$109,621.38
Holdback:	\$10,962.14
Advance:	\$98,659.24
Max Payment:	\$27,404.38
Claim:	\$109,621.38
Total Reimbursement:	\$27,404.38

Total amount of tax assigned to RFCPP by recipient - 50% GST

These invoices were originally tallied in the mandatory progress report (see PATH Action ID No. 79).

Cell formula changed to reflect no tax charged to RFCPP by recipient

Cell formula changed to reflect year-end report, so no holdback

Cell formula changed to reflect total reimbursement

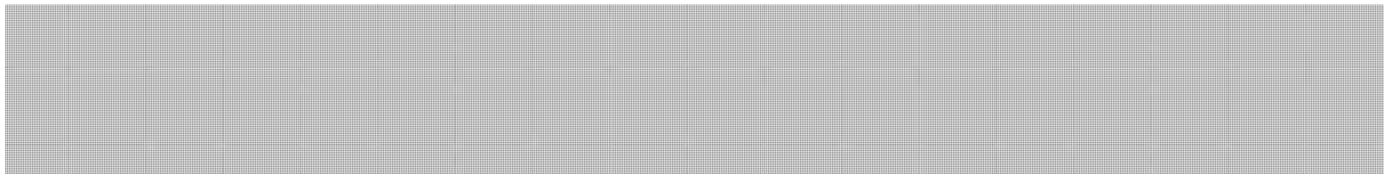
**Nutton, Byron**

---

**From:** Runciman, Bruce  
**Sent:** 2019–March-18 2:14 PM  
**To:** Boutillier, Jaclyn  
**Cc:** Nutton, Byron  
**Subject:** RE: For Approval - 16-HPAC-01323 - Artlish River Off-Channel Habitat Restoration  
**Attachments:** 16-HPAC-01323 Report Checklist.v2.docx; 16-HPAC-01323 Report Checklist.v2 - tracked changes.docx

Hi Jaclyn.

Thanks for your work on this report. I've gone over the information you provided and made minor edits to the report checklist (see "tracked changes" version, also attached). There is also one point requiring follow-up with the recipient before this package is ready for NHQ:



As long as my changes to the checklist are acceptable, the question of permits/approvals addressed and documented and new versions of edited documents are uploaded to PATH Action ID No. 82, then I recommend Team Leader approval of this reporting package and submission to NHQ for review and payment.

**Byron, can you please confirm that this determination and action are acceptable?**

As always, please let me know if you have any questions or concerns.

Thanks again, Bruce.

PS. I also changed document types in PATH Action ID No. 82 so that the Schedule 7 is "RFCPP - Recipient Report" and the recipient's narrative report is "RFCPP - Recipient Report – Supporting Documents" (instead of the other way around).

**From:** Boutillier, Jaclyn <Jaclyn.Boutillier@dfo-mpo.gc.ca>  
**Sent:** March 7, 2019 3:44 PM  
**To:** Runciman, Bruce <Bruce.Runciman@dfo-mpo.gc.ca>  
**Cc:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Subject:** For Approval - 16-HPAC-01323 - Artlish River Off-Channel Habitat Restoration

Hi Bruce,

Please find attached a Report Checklist, Final Report and all other supporting documents for 16-HPAC-1323 Artlish River Off-Channel Habitat Restoration. All supporting documents are also posted in PATH, **Action Log #82**.

Sufficient information has been provided to justify DFO's acceptance of the group's Annual Report and a payment of: **\$33,827**.

Please let me know if you have any further questions or concern.

Thanks,

**Jaclyn Boutillier**

Fisheries Protection Biologist  
Fisheries Protection Program, Ecosystems Management Branch  
Fisheries and Oceans Canada/Government of Canada  
[Jaclyn.Boutillier@dfo-mpo.gc.ca](mailto:Jaclyn.Boutillier@dfo-mpo.gc.ca)/Tel: 250 756-7263

Programme de protection des pêches, Gestion des écosystèmes  
Pêches et Océans Canada/Gouvernement du Canada  
[Jaclyn.Boutillier@dfo-mpo.gc.ca](mailto:Jaclyn.Boutillier@dfo-mpo.gc.ca)/Tel: 250-756-7263

# RECREATIONAL FISHERIES CONSERVATION PARTNERSHIPS PROGRAM

## Regional Checklist for Reviewing Recipient Reports

<b>Path #:</b>	16-HPAC-01323
<b>Project Title:</b>	Artlish River Off-Channel Habitat Restoration
<b>Proponent Name:</b>	West Coast Aquatic Stewardship Association
<b>Recommended Payment Amount:</b>	\$33,827
<b>Date:</b>	March 7 <sup>th</sup> , 2019

### CHECKLIST

Action	√
<b>Schedule 7 - General</b>	
1. Schedule 7 matches the one in the signed CA and all sections have been duly filled in.	√*
2. Reporting period:	
a. Where this is the first report submitted by a recipient under the CA, the reporting period commences on the day that RFCPP-funded activities first started taking place.	√
b. Where a previous report has been submitted by the recipient under the CA, the reporting period for this report commences the day after the end of the previous reporting period.	
<b>Schedule 7 – Section 1</b>	
3. The “RFCPP funds received year to date” matches the amount in RFCPP records.	√
4. Amounts in Table 1.1 are summed correctly.	√
5. Claimed expenses for expense categories tagged with an asterisk (*) do not exceed the budgeted amount.	n/a
6. The amounts reported in Table 1.1 raise no red flags and align with the timing of Activities in Schedule 5 and the reporting period.	√*
7. Reimbursable taxes have not been claimed (see application form for percentages reimbursable).	√*
8. Table 1.2 has been filled in where budgeted amounts exceed the allowed deviation:	
a. If the deviation was previously approved by DFO: no action required.	
b. If the deviation was not previously approved by DFO: review the reason for the deviation and recommend to NHQ (when submitting the report for payment) whether or not the over-expenditure(s) should be reimbursed. Whether the over-expenditures are reimbursed or not, the recipient must be informed that as per the CA (Sch. 5 s. 6.3) requests for budget reallocations in excess of the set percentage must be submitted to DFO prior to deviating from planned expenditures.	n/a
9. Confirmation letters for all previously unconfirmed cash support and large in-kind support have been received and posted to PATH (applies to multi-year agreements with supplemental conditions for unconfirmed support).	√
10. Support received matches what was detailed in the CA. If different, then no effect on federal and stacking limits has been confirmed.	√*
11. All financial information has been entered in the ‘Actual’ section of the financial tab in PATH.	√
<b>Schedule 7 – Section 2</b>	
12. The status of deliverables matches the claimed expenses and timing of Activities in Schedule 5.	√*
13. Where invoices were provided as deliverables, the total(s) of the invoices match what is reported/claimed in Section 1, Table 1.1.	√*
14. The quality/level of detail of the deliverables provided is sufficient to recommend payment under s. 34 of the <i>Financial Administration Act</i> (i.e., sufficient information has been provided to justify payment).	√

15. Where Table 2.2 has been filled in: <ul style="list-style-type: none"> <li>a. Determine whether the explanation may impact the payment amount being requested by the recipient - address with NHQ when submitting the report for payment.</li> <li>b. Determine whether an amendment may be required – address with NHQ when submitting the report for payment (does not apply to final reports).</li> <li>c. Determine whether as a result of cancelled/delayed activities the stacking limit may be exceeded. If so, the recipient must confirm the actual amounts received from other sources. If the stacking limit was/will be exceeded, the RFCPP recommended payment must be reduced accordingly to ensure that the staking limit is met.</li> </ul>	n/a
16. RFCPP signage follows the RFCPP-FIP Guidelines.	√*
<b>Schedule 7 – Section 3</b>	
17. The “actuals” in Table 3.1 align with the activities and budget table.	√*
18. All capital acquisitions purchased have been included in Table 3.2 (and align with the costs identified in the budget table).	n/a
19. All information provided in Section 3 has been recorded in PATH (for final/annual reports only).	√
<b>Schedule 7 – Section 4</b>	
20. Section 4 has been signed by an authorised representative of the Recipient (does not need to be the CA signatory).	√
<b>Regional Approval</b>	
21. Schedule 7 and all supporting documents (e.g., deliverables) have been posted to PATH.	√*
22. If a multi-year agreement, Schedule 6 for next year has been received and posted to PATH.	n/a
23. If a site visit was completed for the CA, a summary thereof is provided in the comments section below.	n/a
24. The Team Leader has reviewed and approved the recipient report and recommends payment.	√

**COMMENTS:**

1. The recipient accepted all DFO edits prior to regional approval, so none have been highlighted in the current Schedule 7.
6. Amounts reported in Table 1.1 are nearly identical to budgeted amounts, but this is not greatly surprising because all expenses except signage costs were split between RFCPP and other sources of support.
7. Although recipient is eligible for partial tax RFCPP reimbursement (i.e. 50%GST), only a small amount of tax was claimed. Total RFCPP claimed expenses (before tax) nearly maximized the RFCPP reimbursement; a small amount of claimed tax will ensure maximum reimbursement. See attached spreadsheet “16-HPAC-01323 Invoice Summary.xlsx”.
10. Stacking limits were met; in-kind support received from [REDACTED] was higher than expected [REDACTED]. Increased in-kind was provided during project delays which required more man hours and machine time (see PATH Action Log No. 85). Confirmation of this additional support was not requested because a reasonable explanation was provided and stacking limits were met by confirmed support even without the increase.
12. Deliverables match claimed expenses and timing of Activities in Schedule 5. The only task not completed was a fish salvage prior to construction. It was not required as the work site was dry prior to construction (see PATH Action Log No. 81).
13. The total(s) of the invoices match what is reported/claimed in Section 1, Table 1.1 (see attached spreadsheet “16-HPAC-01323\_Invoice Summary.xlsx”).
16. DFO signage was approved (see PATH Action Log No. 71) and installed with a reference map provided (see PATH Action Log No. 82).
17. All restoration efforts were exceeded and there are no issues with the “actuals” aligning with activities and budget.
21. See PATH Action Log No. 82.



**CALCULATIONS FOR RECOMMENDED PAYMENT:**

Total 2017-18 agreement amount:	\$124,810
Payments requisitioned to date:	\$90,983 (initial advance)
Recipient eligible expenses reported on:	\$124,810
Amount eligible for reimbursement:	\$ 33,827 (total agreement amount, less payments to date)
<b>Recommended reimbursement payment amount: \$33,827</b>	

# RECREATIONAL FISHERIES CONSERVATION PARTNERSHIPS PROGRAM

## Regional Checklist for Reviewing Recipient Reports

<b>Path #:</b>	16-HPAC-01323
<b>Project Title:</b>	Artlish River Off-Channel Habitat Restoration
<b>Proponent Name:</b>	West Coast Aquatic Stewardship Association
<b>Recommended Payment Amount:</b>	\$33,827
<b>Date:</b>	March 7 <sup>th</sup> , 2019

### CHECKLIST

Action	
<b>Schedule 7 - General</b>	
1. Schedule 7 matches the one in the signed CA and all sections have been duly filled in.	√*
2. Reporting period:	
a. Where this is the first report submitted by a recipient under the CA, the reporting period commences on the day that RFCPP-funded activities first started taking place.	√
b. Where a previous report has been submitted by the recipient under the CA, the reporting period for this report commences the day after the end of the previous reporting period.	
<b>Schedule 7 – Section 1</b>	
3. The “RFCPP funds received year to date” matches the amount in RFCPP records.	√
4. Amounts in Table 1.1 are summed correctly.	√
5. Claimed expenses for expense categories tagged with an asterisk (*) do not exceed the budgeted amount.	√n/ a
6. The amounts reported in Table 1.1 raise no red flags and align with the timing of Activities in Schedule 5 and the reporting period.	√*
7. Reimbursable taxes have not been claimed (see application form for percentages reimbursable).	√*
8. Table 1.2 has been filled in where budgeted amounts exceed the allowed deviation:	
a. If the deviation was previously approved by DFO: no action required.	
b. If the deviation was not previously approved by DFO: review the reason for the deviation and recommend to NHQ (when submitting the report for payment) whether or not the over-expenditure(s) should be reimbursed. Whether the over-expenditures are reimbursed or not, the recipient must be informed that as per the CA (Sch. 5 s. 6.3) requests for budget reallocations in excess of the set percentage must be submitted to DFO prior to deviating from planned expenditures.	n/a
9. Confirmation letters for all previously unconfirmed cash support and large in-kind support have been received and posted to PATH (applies to multi-year agreements with supplemental conditions for unconfirmed support).	√
10. Support received matches what was detailed in the CA. If different, then no effect on federal and stacking limits has been confirmed.	√*
11. All financial information has been entered in the ‘Actual’ section of the financial tab in PATH.	√
<b>Schedule 7 – Section 2</b>	
12. The status of deliverables matches the claimed expenses and timing of Activities in Schedule 5.	√*
13. Where invoices were provided as deliverables, the total(s) of the invoices match what is reported/claimed in Section 1, Table 1.1.	√*
14. The quality/level of detail of the deliverables provided is sufficient to recommend payment under s. 34 of the <i>Financial Administration Act</i> (i.e., sufficient information has been provided to justify payment).	√

15. Where Table 2.2 has been filled in:	
<ul style="list-style-type: none"> <li>a. Determine whether the explanation may impact the payment amount being requested by the recipient - address with NHQ when submitting the report for payment.</li> <li>b. Determine whether an amendment may be required – address with NHQ when submitting the report for payment (does not apply to final reports).</li> <li>c. Determine whether as a result of cancelled/delayed activities the stacking limit may be exceeded. If so, the recipient must confirm the actual amounts received from other sources. If the stacking limit was/will be exceeded, the RFCPP recommended payment must be reduced accordingly to ensure that the staking limit is met.</li> </ul>	n/a
16. RFCPP signage follows the RFCPP-FIP Guidelines.	√*
<b>Schedule 7 – Section 3</b>	
17. The “actuals” in Table 3.1 align with the activities and budget table.	√*
18. All capital acquisitions purchased have been included in Table 3.2 (and align with the costs identified in the budget table).	n/a
19. All information provided in Section 3 has been recorded in PATH (for final/annual reports only).	√
<b>Schedule 7 – Section 4</b>	
20. Section 4 has been signed by an authorised representative of the Recipient (does not need to be the CA signatory).	√
<b>Regional Approval</b>	
21. Schedule 7 and all supporting documents (e.g., deliverables) have been posted to PATH.	√*
22. If a multi-year agreement, Schedule 6 for next year has been received and posted to PATH.	n/a
23. If a site visit was completed for the CA, a summary thereof is provided in the comments section below.	n/a
24. The Team Leader has reviewed and approved the recipient report and recommends payment.	√

**COMMENTS:**

1. ~~Recipient~~ The recipient accepted all DFO edits, errors and corrections prior to the Schedule 7 regional approval, so none have been corrected and highlighted per RFCPP guidance in the current Schedule 7.

6. Amounts reported in Table 1.1 are nearly identical to budgeted amounts, but this is not greatly surprising because all expenses except signage costs were split between RFCPP and other sources of support.

7. Although recipient is eligible for partial tax RFCPP reimbursement (i.e. 50%GST), only a small amount of tax was claimed. Total RFCPP claimed expenses (before tax) nearly maximized the RFCPP reimbursement; a small amount of claimed tax will ensure maximum reimbursement. See attached spreadsheet “16-HPAC-01323 Invoice Summary.xlsx”.

10. Stacking limits were met; in-kind support received from [REDACTED] was higher than expected [REDACTED]. Increased in-kind was provided during project delays which required more man hours and machine time (see PATH Action Log No. 85). Confirmation of this additional support was not requested because a reasonable explanation was provided and stacking limits were met by confirmed support even without the increase.

12. Deliverables match claimed expenses and timing of Activities in Schedule 5. The only task not completed was a fish salvage prior to construction. It was not required as the work site was dry prior to construction (see PATH Action Log No. 81).

13. The total(s) of the invoices match what is reported/claimed in Section 1, Table 1.1 (see attached spreadsheet “16-HPAC-01323\_Invoice Summary.xlsx”).

16. DFO signage was approved (see PATH Action Log No. 71) and installed with a reference map provided (see PATH Action Log No. 82).

17. All restoration efforts were exceeded and there are no issues with the “actuals” aligning with activities and budget.

21. See PATH Action Log No. 82.

**CALCULATIONS FOR RECOMMENDED PAYMENT:**

Total 2017-18 agreement amount:	\$124,810
Payments requisitioned to date:	\$90,983 (initial advance)
Recipient eligible expenses reported on:	\$124,810
Amount eligible for reimbursement:	\$ 33,827 (total agreement amount, less payments to date)
<b>Recommended reimbursement payment amount: \$33,827</b>	

## Nutton, Byron

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**From:** Portail HRG/HRG Portal <EMT.Admin@hrgworldwide.com>  
**Sent:** 2019-March-18 4:10 PM  
**To:** Nutton, Byron  
**Subject:** Action Required - TR Approval

### BYRON NUTTON

A Travel Request has been submitted to you for approval. Please log in to the STS Portal and select Manage Expenses to review.

[Click here for the STS Portal](#)

### Transaction Approval Action Required

The following transaction approval actions are required for the following employees.

Nadine Pinnell - Travel Requests - 01/03/2019 to 31/03/2019

S32 Approval

07/03/2019	BTA 2018-19	\$ 1.00
	BTA 2018-19	
	T525 5B521 310 120 50000 6 - - 0500 N/A 1.00	

## **Nutton, Byron**

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**From:** Hardacre, Kim  
**Sent:** 2019–March-13 12:33 PM  
**To:** Nutton, Byron  
**Subject:** Accepted: PSPM

## Nutton, Byron

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**From:** Groenewoud, Taylor (EC) <taylor.groenewoud@canada.ca>  
**Sent:** 2019–March-13 3:12 PM  
**To:** Committee Facilitator; Jack Smith; Nutton, Byron; Engelsjord, Michael  
**Cc:** Darrell Desjardin [REDACTED]  
**Subject:** RE: {2200-001.01}13Mar\_eml\_facilitator\_to\_DFO\_PRPA\_ECCC\_Comments(or further comments on the EEE)

Hi Darrell,

ECCC will be providing more comments (related to wildlife) on the draft EEE. Comments will be in by Friday.

Cheers,  
Taylor

### Taylor Groenewoud MRM (Planning)

Environmental Assessment Coordinator, P&Y Environmental Protections and Operations  
Environment and Climate Change Canada | Government of Canada  
[taylor.groenewoud@canada.ca](mailto:taylor.groenewoud@canada.ca) | Tel: 604-666-8342

Coordonnatrice de l'évaluation environnementale, Activités de protection de l'environnement P&Y  
Environnement et changement climatique Canada | Gouvernement du Canada  
[taylor.groenewoud@canada.ca](mailto:taylor.groenewoud@canada.ca) | Tél: 604-666-8342

*I acknowledge that I work, live and play on the unceded and traditional territories of the Musqueam, Squamish and Tsleil Wautuh First Nations.*

**From:** Committee Facilitator <Committee.Facilitator@hemmera.com>  
**Sent:** Wednesday, March 13, 2019 11:01 AM  
**To:** Jack Smith <jsmith@rupertport.com>; Byron Nutton <Byron.Nutton@dfo-mpo.gc.ca>; Groenewoud, Taylor (EC) <taylor.groenewoud@canada.ca>; Michael Engelsjord DFO <Michael.Engelsjord@dfo-mpo.gc.ca>  
**Cc:** Darrell Desjardin <d-desjardin@hemmera.com>; [REDACTED]  
**Subject:** {2200-001.01}13Mar\_eml\_facilitator\_to\_DFO\_PRPA\_ECCC\_Comments(or further comments on the EEE)

Hello Taylor, Jack, and Byron/Michael

I am writing in order to confirm whether you / your team will be providing comments (or further comments) on the RTI Berth Expansion Draft Evaluation report and/or appendices

The deadline for comments has been drawn for end of day Friday.

Regards,  
Darrell

Darrell Desjardin  
Technical Committee Facilitator

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If you receive this transmission in error, please destroy all copies and notify the sender by replying to this transmission

[Confidentiality Notice](#)



## Nutton, Byron

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**From:** Olson, Charlotte <Charlotte.Olson@portvancouver.com>  
**Sent:** 2019–March-13 3:12 PM  
**To:** Nutton, Byron; Thorpe, Suzanne  
**Cc:** Ruffo, Gord; Scott Northrup  
**Subject:** RE: Assisted Assessment - Maplewood - supplement to support Project Confirmation

Hi Byron, thanks, we appreciate you reviewing the Project Confirmation, and look forward to discussing tomorrow.

To answer your query, VFPA did not conduct any marine water quality sampling of existing marine waters within the marine basin(s), if that is what you are asking for. There was no reason to do that. However, as part of MMRP project development in Spring 2018 we did a robust investigation program to sample upland groundwater (PI/PII ESA), and we sampled all relevant marine sediments in the marine basins and SW Channel (see below). We also conducted detailed coastal modelling as part of the design development process, the coastal modelling and 60% design report is included in the CEP FAA Application (February 2018). Below I provide the other relevant work completed later in 2018.

In spring 2018 we completed a Phase 1 ESA and Phase 2 ESA to evaluate any areas of potential environmental concern (APECs) in the upland areas, and drilled and installed groundwater monitoring wells in the upland to sample groundwater quality, to ensure no potential groundwater contaminants of concern (COCs) were flowing into the marine basins, that may affect the restoration work. The Phase 1 and Phase 2 ESA work was part of the work required by the port's Project and Environmental Review Permit (PER), and the results were reviewed and approved under PER#17-278, which was issued in February 2019.

These reports can be found online (as one PDF) on the regulatory PER page, direct link is here:

*"Limited Phase II Environmental Site Assessment" (See Appendix for PI)*

<https://www.portvancouver.com/wp-content/uploads/2018/08/Attachment-04-MMRP-Limited-Phase-II-ESA-July-2018.pdf>

Note that a concluding statement from the work/report above by QEP includes:

*"In summary, to meet the VFPA Project and Environmental Review requirements (under PER#17-278), the groundwater flow from the Adjacent Property to the Northeast Basin meets the CCME Canadian Water Quality Guidelines and the APECs on the Adjacent Property do not pose a risk to the MMRP".*

The team also conducted a robust Sediment Characterization investigation and reporting program as part of PER#17-278 and to support our ECCC DAS exemption application, full report/results can be found here:

<https://www.portvancouver.com/wp-content/uploads/2018/08/Attachment-05-MMRP-Sediment-Characterization-July-2018.pdf>

- The above Sediment Characterization Report was reviewed by Environment and Climate Change Canada (ECCC) DAS, and the proposed dredging and reuse of onsite sediments to construct the MMRP was approved by ECCC DAS by "Letter of Advice" received in February 2019

A variety of other reports/details as part of the PER#17-278 regulatory submission process can be found here:

<https://www.portvancouver.com/development-and-permits/status-of-applications/maplewood-marine-restoration-project/>

I trust this information meets your request, please don't hesitate to follow up.

Regards,

CELL: 604.349.4111

**From:** Nutton, Byron [mailto:Byron.Nutton@dfo-mpo.gc.ca]  
**Sent:** Wednesday, March 13, 2019 2:40 PM  
**To:** Olson, Charlotte <Charlotte.Olson@portvancouver.com>; Thorpe, Suzanne <Suzanne.Thorpe@dfo-mpo.gc.ca>  
**Cc:** Ruffo, Gord <Gord.Ruffo@portvancouver.com>; Scott Northrup [REDACTED]  
**Subject:** RE: Assisted Assessment - Maplewood - supplement to support Project Confirmation  
**Importance:** High

Hi Charlotte,

Thank you for forwarding the information regarding the proposed habitat banking project in the basin at Maplewood Flats. Suzanne and I are doing our best within the short time we have before our call with you tomorrow.

I am looking through the information you sent us recently as well as the documentation provided with the Centerm Application for Authorization but I cannot find any reference to water quality sampling in the basin.

Can you confirm whether or not a water sampling program was conducted or if existing data was referenced, and if so point me to where I might find it in the documentation submitted.

Thanks,

Byron

**From:** Olson, Charlotte <Charlotte.Olson@portvancouver.com>  
**Sent:** 2019-March-11 9:49 AM  
**To:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>; Thorpe, Suzanne <Suzanne.Thorpe@dfo-mpo.gc.ca>  
**Cc:** Ruffo, Gord <Gord.Ruffo@portvancouver.com>; Scott Northrup [REDACTED]  
**Subject:** RE: Assisted Assessment - Maplewood - supplement to support Project Confirmation

Per my note below, attached is the supplementary supporting document "MMRP QEP Assisted Assessment"

Regards,  
Charlotte

**From:** Olson, Charlotte  
**Sent:** Monday, March 11, 2019 9:46 AM  
**To:** 'Nutton, Byron' <Byron.Nutton@dfo-mpo.gc.ca>; Thorpe, Suzanne <Suzanne.Thorpe@dfo-mpo.gc.ca>  
**Cc:** Ruffo, Gord <Gord.Ruffo@portvancouver.com>; Scott Northrup [REDACTED]  
**Subject:** Project Confirmation - Maplewood - FOR DFO REVIEW  
**Importance:** High

Good morning Byron and Suzanne,  
As discussed last Thursday, please find attached:

- Project Confirmation for the Maplewood Marine Restoration Project

We are looking forward to your review, and our discussion this Thursday at 11:30am.

Due to file size, note that in a separate email I will be providing the QEP Assisted Assessment, as supplementary documentation for your review if helpful.

Regards,  
Charlotte

**Charlotte Olson** P.Geo., PMP  
Manager, Infrastructure Habitat Development



**Vancouver Fraser Port Authority**  
100 The Pointe, 999 Canada Place  
Vancouver, B.C. Canada V6C 3T4

P: 604.665.9590 | CELL: 604.349.4111  
[portvancouver.com](http://portvancouver.com)



Hemmera Envirochem Inc.  
18<sup>th</sup> Floor, 4730 Kingsway  
Burnaby, BC V5H 0C6  
T: 604.669.0424  
F: 604.669.0430  
[hemmera.com](http://hemmera.com)

July 26, 2018  
File: 989565-05

Vancouver Fraser Port Authority  
100 The Pointe  
999 Canada Place  
Vancouver, BC V6C 3T4

**Attn: Charlotte Olson, P.Geo., PMP, Manager, Infrastructure Habitat Development**

Dear Ms. Olson,

**Re: Limited Phase II Environmental Site Assessment – Maplewood Marine Restoration Project, Burrard Inlet, North Vancouver, BC**

This Work was performed in accordance with the Contract for Environmental Advisory Services for Phase 2 of the Habitat Enhancement Program (Contract Number 81303) between Hemmera Envirochem Inc. and Vancouver Fraser Port Authority, dated July 1, 2015 ("Contract"). This Report has been prepared by Hemmera, based on fieldwork conducted by Hemmera, for sole benefit and use by the Vancouver Fraser Port Authority. In performing this Work, Hemmera has relied in good faith on information provided by others, and has assumed that the information provided by those individuals is both complete and accurate. This Work was performed to current industry standard practice for similar environmental work, within the relevant jurisdiction and same locale. The findings presented herein should be considered within the context of the scope of work and project terms of reference; further, the findings are time sensitive and are considered valid only at the time the Report was produced. The conclusions and recommendations contained in this Report are based upon the applicable guidelines, regulations, and legislation existing at the time the Report was produced; any changes in the regulatory regime may alter the conclusions and/or recommendations.

## **1.0 INTRODUCTION**

The Vancouver Fraser Port Authority (VFPA) retained Hemmera Envirochem Inc. (Hemmera) to conduct a Limited Phase II Environmental Site Assessment (ESA) for potential impacts to the Maplewood Basin. The Maplewood Basin consists of the previously dredged area of the Maplewood Flats, encompassing the Northeast Basin and Main Basin (**Figure 1**). For the purposes of this Limited Phase II ESA, the Maplewood Basin is referred to as the "Site". The Phase II ESA was conducted to determine potential impacts to the

**Pages 419 to / à 583**  
**are public-denied pursuant to section**  
**est public-refusé en vertu de l'article**

**68(a)**

**of the Access to Information Act**  
**de la Loi sur l'accès à l'information**



# Maplewood Marine Restoration Project Sediment Characterization

**Prepared for:**

**Vancouver Fraser Port Authority**

100 The Pointe  
999 Canada Place  
Vancouver, BC V6C 3T4

Project No. 989565-05

July 31, 2018

**Prepared by:**

**Hemmera Envirochem Inc.**

18th Floor, 4730 Kingsway  
Burnaby, BC V5H 0C6  
T: 604.669.0424  
F: 604.669.0430  
hemmera.com

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**68(a)**

**of the Access to Information Act**  
**de la Loi sur l'accès à l'information**

## Nutton, Byron

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**From:** Boutillier, Jaclyn  
**Sent:** 2019–March-13 4:26 PM  
**To:** Runciman, Bruce  
**Cc:** Nutton, Byron  
**Subject:** For approval - 16-HPAC-00242 - Old Massett Recreational Fish Habitat Restoration - PROGRESS REPORT  
**Attachments:** [REDACTED] shared 6 photos with you using Dropbox; 16-HPAC-00242 - Progress Report Checklist.docx; 16-HPAC-00242 Progress Report Photos.pdf; 16-HPAC-00242 - Progress Report - Invoice Summary.xlsx; 16-HPAC-00242 - Project Invoices to date.docx; 16 HPAC-00242 Schedule 7C\_v2 - Progress Report.docx; 16 HPAC-00242 Schedule 7C\_v2 - Signed by recipient.pdf

Hi Bruce,

Please find attached a Report Checklist, Progress Report and all other supporting documents for 16-HPAC-00242 Old Massett Recreational Fish Habitat Restoration. This is an interim report. All supporting documents are also posted in PATH, **Action Log #143**.

Sufficient information has been provided to justify DFO's acceptance of the group's Progress Report and the remainder of their advance payment of: **\$10,800.00**.

If possible, could this report be given priority over my other recent submissions? As we are the sole funder of the project (other than themselves), the group is hopeful to get the remainder of their advance funds. In addition, I have included two versions of the Schedule 7C (see attached); one is a pdf. copy signed by the recipient, and the other is a doc. version that can be edited if required.

Please let me know if you have any further questions or concern.

Thanks,

## Jaclyn Boutillier

Fisheries Protection Biologist  
Fisheries Protection Program, Ecosystems Management Branch  
Fisheries and Oceans Canada/Government of Canada  
[Jaclyn.Boutillier@dfo-mpo.gc.ca](mailto:Jaclyn.Boutillier@dfo-mpo.gc.ca)/Tel: 250 756-7263

Programme de protection des pêches, Gestion des écosystèmes  
Pêches et Océans Canada/Gouvernement du Canada  
[Jaclyn.Boutillier@dfo-mpo.gc.ca](mailto:Jaclyn.Boutillier@dfo-mpo.gc.ca)/Tel: 250-756-7263



**Nutton, Byron**

---

**From:** [REDACTED]  
**Sent:** 2019-March-06 5:22 PM  
**To:** Boutillier, Jaclyn  
**Subject:** [REDACTED] has shared 6 photos with you using Dropbox

Hi, Jaclyn

Here's a link to 6 photos in my Dropbox:

I will send you additional photos by separate email.

[REDACTED]

The restoration project has been ongoing since Feb 4th to the present and will continue to March 31, 2019. The project involves 8 Old Masset Village Council workers undertaking felling and girdling riparian silviculture Technique's in riparian Polygon 54 which is one of three pilot Polygons! Funding has been provided by DFO RFCPP (\$88k) and [REDACTED] with the remaining funding coming directly from Old Masset Village Council (OMVC)!

The riparian zones on the Yakoun and Mamin Rivers on Haida Gwaii and as many as 30 other watersheds on Haida Gwaii have been severely impacted since they were logged to the stream-bank from the old Pre-code logging practices of the 50's and 60's!

These massive cut blocks that extended from the uplands all the way to the river bank were then hand planted to mono culture Sitka spruce (Ss) plantations in the 60's that then experienced Western hemlock (Hw) infill and sat at densities in the 3500+ sph range through the 70's and 80's.

These overstocked Ss plantations (RVT 2) were then thinned in the late 80's down to 1600 sph right to the stream bank. They have sat in this overstocked state as 1600 sph older Ss plantations up to the present day.

The Haida Gwaii Land Use Objectives Order signed by the Haida Nation and Govt of BC has many objectives that call for intervention to create objectives that are missing or of limited supply in riparian reserve zones that were impacted by logging. Although this Objectives Order has been in place for many years, no riparian restoration interventions have take place to date.

The riparian restoration work currently being undertaken in these 3 pilot Polygons on the Mamin and Yakoun essentially transforms these older RVT 2 overstocked Ss plantations and creates spatial and vertical diversity as well as arange Of biodiversity features that provide ideal Goss hawk and Saw whet owl feeding habitat.

Pictures of this transformation are attached to these drop box files and also I will send an additional email with more pictures attached!

If you have any more questions pls feel free to contact me.

Regards, [REDACTED]

**Pages 926 to / à 931**

**are duplicates**

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# RECREATIONAL FISHERIES CONSERVATION PARTNERSHIPS PROGRAM

## Regional Checklist for Reviewing Recipient Reports

<b>Path #:</b>	16-HPAC-00242
<b>Proponent Name:</b>	Old Massett Village Council
<b>Recommended Payment Amount:</b>	\$10,800.00
<b>Date:</b>	March 13 <sup>th</sup> , 2019

### CHECKLIST

Action	√
<b>Schedule 7 - General</b>	
1. Schedule 7 matches the one in the signed CA and all sections have been duly filled in.	√*
2. Reporting period: <ul style="list-style-type: none"> <li>a. Where this is the first report submitted by a recipient under the CA, the reporting period commences on the day that RFCPP-funded activities first started taking place.</li> <li>b. Where a previous report has been submitted by the recipient under the CA, the reporting period for this report commences the day after the end of the previous reporting period.</li> </ul>	√
<b>Schedule 7 – Section 1</b>	
3. The “RFCPP funds received year to date” matches the amount in RFCPP records.	√
4. Amounts in table 1.1 are summed correctly.	√
5. Claimed expenses for expense categories tagged with an asterisk (*) do not exceed the budgeted amount.	N/A
6. The amounts reported in table 1.1 raise no red flags and align with the timing of Activities in Schedule 5 and the reporting period.	√
7. All financial information has been entered in the ‘Actual’ section of the financial tab.	√*
8. Reimbursable taxes have not been claimed (see application form for percentages reimbursable).	√*
9. Table 1.2 has been filled in where budgeted amounts exceed the allowed deviation: <ul style="list-style-type: none"> <li>a. If the deviation was previously approved by DFO: no action required.</li> <li>b. If the deviation was not previously approved by DFO: review the reason for the deviation and recommend to NHQ (when submitting the report for payment) whether or not the over-expenditure(s) should be reimbursed. Whether the over-expenditures are reimbursed or not, the recipient must be informed that as per the CA (Sch. 5 s. 6.3) requests for budget reallocations in excess of the set percentage must be submitted to DFO prior to deviating from planned expenditures.</li> </ul>	N/A
<b>Schedule 7 – Section 2</b>	
10. The status of deliverables matches the claimed expenses and timing of Activities in Schedule 5.	√
11. Where invoices were provided as deliverables, the total(s) of the invoices match what is reported/claimed in section 1, table 1.1.	√
12. The quality/level of detail of the deliverables provided is sufficient to recommend payment under s. 34 of the <i>Financial Administration Act</i> (i.e., sufficient information has been provided to justify payment).	√*

13. Where table 2.2 has been filled in: a. Determine whether the explanation may impact the payment amount being requested by the recipient - address with NHQ when submitting the report for payment. b. Determine whether an amendment may be required – address with NHQ when submitting the report for payment (does not apply to final reports). c. Determine whether as a result of cancelled/delayed activities the stacking limit may be exceeded. If so, the recipient must confirm the actual amounts received from other sources. If the stacking limit was/will be exceeded, the RFCPP recommended payment must be reduced accordingly to ensure that the staking limit is met.	N/A
14. RFCPP signage follows the RFCPP-FIP Guidelines.	√*
<b>Schedule 7 – Section 3</b>	
15. The “actuals” in table 3.1 align with the activities and budget table.	N/A
16. All capital acquisitions purchased have been included in table 3.2 (and align with the costs identified in the budget table).	N/A
17. All information provided in section 3 has been recorded in PATH (for final/annual reports only).	√*
<b>Schedule 7 – Section 4</b>	
18. Section 4 has been signed by an authorised representative of the Recipient (does not need to be the CA signatory).	√
<b>Regional Approval</b>	
19. Schedule 7 and all supporting documents (e.g., deliverables) have been posted to PATH.	√*
20. If a site visit was completed for the CA, a summary thereof is provided in the comments section below.	N/A
21. The Team Leader has reviewed and approved the recipient report and recommends payment.	√

#### COMMENTS:

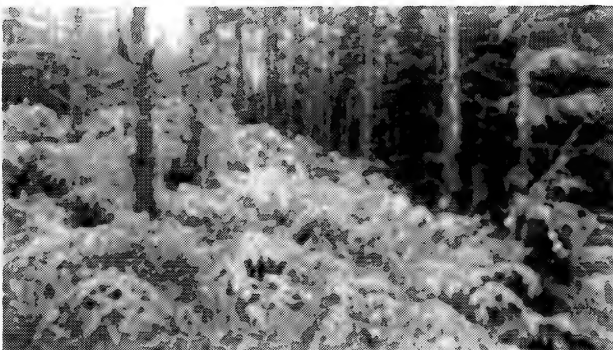
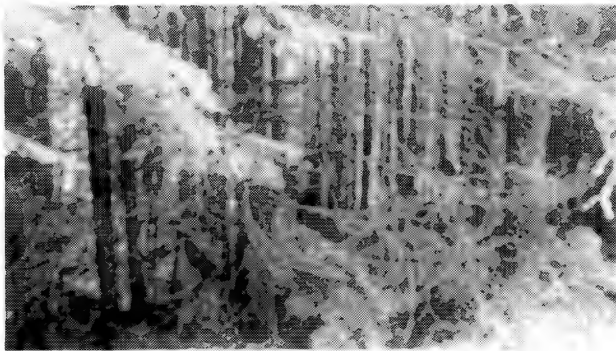
1. Recipient edits, errors and corrections to the Schedule 7C have been corrected and highlighted per RFCPP guidance.
7. Not a final report, so no financial information entered in PATH.
8. Where applicable, recipient has claimed eligible 50% GST RFCPP reimbursement.
12. The deliverables provided are in proportion with the expenses reported and the status of activities indicated in Table 2.1 of Schedule 7. The recipient provided both a progress report as well as photo documentation of restoration activities to date.
14. This activity is not yet started.
17. Not a final report, so no information has been entered in PATH.
19. See PATH Action Log No. 143.

#### CALCULATIONS FOR RECOMMENDED PAYMENT:

Total agreement amount:	\$88,000.00
Payments requisitioned to date:	\$68,400.00 (initial advance)
Recipient eligible expenses reported on:	\$40,743.75
Amount eligible for reimbursement:	\$19,600 (total agreement amount, less payments to date)
Less 10% holdback:	\$8,800.00
<b>Recommended reimbursement payment amount:</b>	<b>\$10,800.00</b>













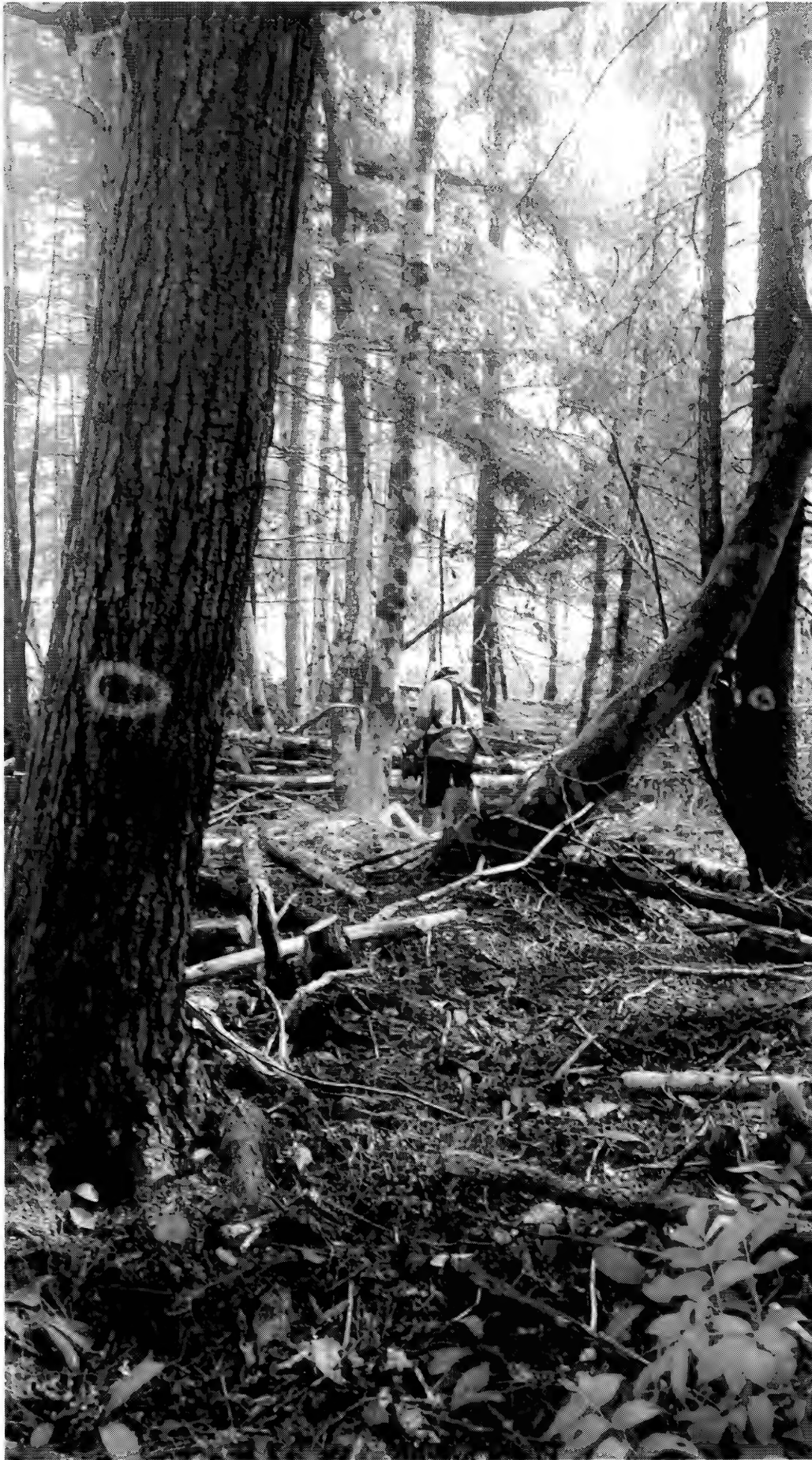












# RFCPP Report Invoice Summary

Project Title: PATH No:		Old Massett Recreational Fish Habitat Restoration 16-HPAC-00242		% GST Rate: % PST Rate:		5.00% % GST NOT Reimbursable by CRA: 7.00% % PST NOT Reimbursable by Province:		50.00% 100.00%	
Expense Category	Expense Description	Invoice Date	Invoice Identifier # & Supplier	Invoice Amt (excluding taxes & MERCs)	RFCPP Eligible Expense (excluding taxes & MERCs)	RFCPP Eligible Taxes & MERCs	RFCPP Total Eligible Expense (including taxes & MERCs)	Final Total for Expense Category	
Contract and Professional Services	Boaters specialists (snag falling and cultural features)	28-Feb-19	2019-03 - Quilicum Environmental Services	\$39,250.00	\$9,900.00	\$247.50	\$10,147.50		
	Restoration specialists (restoration implementation)	28-Feb-19	2019-03 - Quilicum Environmental Services	\$34,750.00	\$16,500.00	\$412.50	\$16,912.50		
	First aid attendant (15 days @ \$105/day)	28-Feb-19	2019-03 - Quilicum Environmental Services	\$36,750.00	\$1,500.00	\$17.50	\$1,537.50		
	Repair workers (21 days @ \$150/day)	28-Feb-19	2019-03 - Quilicum Environmental Services	\$39,750.00	\$5,250.00	\$11.25	\$5,381.25		
	Project management (22 days @ \$400/day)	28-Feb-19	2019-02 - Quilicum Environmental Services	\$39,750.00	\$6,600.00	\$185.00	\$6,785.00		
TOTAL CLAIMING UNDER RFCPP \$								40,743.75	

Notes:

Agreement Amt:	\$88,000.00
Holdback:	\$8,800.00
Advance:	\$68,400.00
Max Payment:	\$40,473.75
Claim:	\$40,743.75
Remaining Adv.:	\$10,880.00

Cell formula has been changed to reflect interim report request for remaining advance payment.

## Quillicum Environmental Services Ltd

Box 51552  
545 Park Royal South  
West Vancouver, BC  
Canada V7T 2X9

### INVOICE

Invoice #: 2019-03  
Feb 28, 2019

Old Massett Village Council  
Po Box 175 Massett BC V0T1M0  
Attn: Carrie Samuels & Christina Bull

---

Re: Contract and Professional Services

---

Services of Quillicum Environmental Services Ltd

TO ALL PROFESSIONAL SERVICES RENDERED: Bart Simmons (B), Eri Foster (E)  
and Christophe Boyer (C)

1. Riparian specialists for snag falling and cultural features layout

- 
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- 
- 

2. Riparian specialists for 26 day riparian implementation

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- 

3. First Aid Attendant for 26 day riparian implementation

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- 
- 

4. OMVC Contract Workers for 26 day riparian implementation

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**s.20(1)(c)**

- •  
•  
•

- TOTAL

000944

s.20(1)(b)

1. Schedule 7C

s.20(1)(c)

1.1. Schedule 7C of the Agreement is hereby deleted and replaced with the following:

**SCHEDULE 7C**

**PROGRESS REPORT / YEAR-END REPORT**

**Recreational Fisheries Conservation Partnerships Program**

<b>Fiscal Year:</b>	2018-19
<b>Agreement Number:</b>	16-HPAC-00242
<b>Name and Address of Recipient:</b>	Old Massett Village Council PO Box 175 Masset, BC V0T 1M0
<b>Amount of Approved Contribution:</b>	\$88,000

**Reporting period:** from: February 4, 2019 to March 1, 2019

<b>Type of report:</b>	<b>Purpose of report:</b>
<input checked="" type="checkbox"/> Progress Report	<input checked="" type="checkbox"/> Request for advance payment
<input type="checkbox"/> Year-end Report	<input checked="" type="checkbox"/> Request for reimbursement
<input type="checkbox"/> Final Report	<input type="checkbox"/> Release holdback

**Section 1 – Financial Summary**

**RFCPP funds received year to date:** \$68,400

All highlighted edits by DFO

**Table 1.1: RFCPP Budget 2018-19**

Fill in the last five columns. Do not alter the information in the first three columns.

<b>Expense category</b>	<b>Expense description</b>	<b>RFCPP planned budget, including taxes reimbursable by the RFCPP*</b>	<b>Actual RFCPP expenses for current reporting period</b>	<b>Actual RFCPP expenses April 1, 2018 to end of current reporting period</b>	<b>Planned RFCPP expenses for next reporting period (if applicable)</b>
Contract or professional service costs	<p><b>Portion of:</b></p> <p>Snag falling for worker safety prior to crew deployment &amp; layout of cultural features:</p> <ul style="list-style-type: none"> <li></li> <li></li> </ul> <p>Riparian restoration prescription implementation:</p> <ul style="list-style-type: none"> <li></li> <li></li> <li></li> </ul>	\$87,550	\$40,743.75 <del>\$39,750.00</del>	\$40,743.75	\$46,806.25



Printing and production costs		\$450	\$0	\$0	\$450
<b>Total</b>		<b>\$88,000</b>	<b>\$40,743.75</b>	<b>\$40,743.75</b>	<b>\$47,256.25</b>

\* The RFCPP can only reimburse GST/HST that is not reimbursable by Canada Revenue Agency and PST not reimbursable by the provinces.

### Table 1.2: Budget Deviations

**Progress reports:** Where the 'Expenses year to date' have exceeded the RFCPP budget by 10% for a given expense category, please provide an explanation. Add rows as required.

**Year-end reports:** Where the 'Expenses year to date' have deviated above or below the RFCPP budget by 10% for a given expense category, please provide an explanation. Add rows as required.

Expense category	RFCPP budget	Expenses year to date	Under- or Over-budget amount	Reason for budget deviation

### Table 1.3: Other Sources of Support for 2018-19 (for year-end and final reports only)

Indicate the amounts received from other sources of support in the appropriate column. Add rows as required.

a) Organization Name, Description of activities to be funded and Valuation of Support	b) \$ Value federal cash support	c) \$ Value provincial/municipal cash support	d) \$ Value other cash support	e) \$ Value in-kind support	f) Total \$ Support
<b>Old Massett Village Council</b> Costs incurred after March 31 <sup>st</sup> , 2018 for 2017/18 project works.					
<b>Old Massett Village Council</b> For costs incurred for 2018/19 project works (travel and accommodation for riparian specialists, mod/demob of crew and transport vehicles, vehicle, field and safety equipment costs and maintenance, office expenditures)					
<b>Sub-total</b>	\$	\$	\$	\$	\$
<b>Total 2016-18 (from Schedule 7B, Table 1.3)</b>	\$	\$	\$	\$	\$
<b>Project Total 2016-19</b>	\$	\$	\$	\$	\$

## Section 2 – Deliverables

Table 2.1

Activities and Associated Deliverables	Status of Activity
<b>Activity 1: Project Implementation</b>  <b>Deliverables to provide to DFO:</b> <ul style="list-style-type: none"> <li>Year-end report that includes a written description of the works undertaken as well as annotated photo documentation of all restoration activities showing the works before, during and after completion.</li> <li>Copies of paid invoices, with reimbursable taxes deducted from the total invoice value, for all invoices funded by RFCPP, cross-referenced to the appropriate expense item.</li> </ul>	<input type="checkbox"/> Complete (submit deliverables with report) <input type="checkbox"/> Complete (final deliverables submitted with a previous report) <input checked="" type="checkbox"/> In progress (submit draft deliverables with report) <input type="checkbox"/> Cancelled (provide explanation in table 2.2) <input type="checkbox"/> Delayed (provide explanation in table 2.2) <input type="checkbox"/> Not started (i.e., reporting period prior to activity start date)
<b>Activity 2: Signage</b>  <b>Deliverables to provide to DFO:</b> <ul style="list-style-type: none"> <li>Photograph(s) of the sign installed at the project site(s), cross referenced to a site map showing location of installation.</li> <li>Copies of paid invoices, with reimbursable taxes deducted from the total invoice value, for all invoices for printing and production costs of signage funded by RFCPP.</li> </ul>	<input type="checkbox"/> Complete (submit deliverables with report) <input type="checkbox"/> Complete (final deliverables submitted with a previous report) <input type="checkbox"/> In progress (submit draft deliverables with report) <input type="checkbox"/> Cancelled (provide explanation in table 2.2) <input type="checkbox"/> Delayed (provide explanation in table 2.2) <input checked="" type="checkbox"/> Not started (i.e., reporting prior to activity start date)

**Table 2.2**

For any Activity that was cancelled or delayed, please provide an explanation. Add rows as required.

Activity	Explanation for cancellation/delay

**Table 2.3**

For any activity that required an authorization, please identify the activity, and list the corresponding authorization type, number, and issuing authority. Submit a copy of the authorization to DFO along with the Report. Add rows as required.

Agreement Activity #	Authorization Type	Authorization #	Issuing Authority

**Table 2.4**

Complete this table if any public/media events were organized, or if any public communications (including but not limited to websites, publications, news releases, presentations, reports, advertising, paid announcements and expositions) were undertaken, as related to the Activities of this Agreement. Add rows as required.

Type of Communication (e.g. media/public event, newspaper, newsletter, magazine article, blog)	Communication Details (e.g. title, distribution size, number of participants)	Date of Communication	Web Link (if not posted to the Web, submit a copy with report)

### Section 3 –Measuring Program Performance

**Table 3.1 (for year-end reports only)**

Enter actual amounts in the last column.

Performance Measure		Planned	Actual
Number of partners (organizations) providing cash and/or in-kind support to project (the Recipient and DFO must not be counted as partners):		1	
Number of volunteers (individuals) working on RFCPP-funded activities:		0	
Number of people paid using RFCPP funding:		7	
Shoreline Works	Floodplain and wetland restoration (square metres)	272,000	
	Riparian plantings functional for fish (linear metres of shoreline (if the opposing shorelines both received riparian treatment, enter the cumulative linear measure of shoreline))	0	
	Shoreline stabilization (linear metres of shoreline (if the opposing shorelines are both stabilized, enter the cumulative linear measure of shoreline))	5,440	
Instream Restoration	Restoration of spawning grounds (square metres)	0	
	Artificial reefs (square metres)	0	
	Removal of dam or other significant anthropogenic structure (square metres – footprint of structure)	0	
	Over-wintering habitat (square metres)	0	
	General in-water fish habitat improvement such as, but not limited to, pool and riffle management, channel bypass, rearing and habitat complexing (e.g., installation of large wood debris/ rock) or removal of nuisance vegetation and debris (square metres of channel reach restored)	0	
Fish Passage	Enhancement of fish passage conditions (Linear metres of accessible upstream habitat)	0	
Chemical Manipulation	Improvements of water quality (e.g., aeration or liming) (square metres)	0	

**Table 3.2**

List all capital acquisitions purchased using RFCPP funding (\$1,000 or more per individual item). Add rows as required.

Item and description	Cost
1.	
2.	
3.	

## Section 4 - Confirmation

I hereby confirm that the information provided in this report, including all attachments, is accurate to the best of my knowledge and that I am authorized to sign this report on behalf of the Recipient.

### Option 1: Hard copy signature

Name: \_\_\_\_\_

Position: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

### Option 2: Electronic – check box

☐ I have read and agree with the above statements

Name: \_\_\_\_\_

Position: \_\_\_\_\_ Date: \_\_\_\_\_

**1. Schedule 7C**

1.1. Schedule 7C of the Agreement is hereby deleted and replaced with the following:

**SCHEDULE 7C****PROGRESS REPORT / YEAR-END REPORT****Recreational Fisheries Conservation Partnerships Program**

Fiscal Year:	2018-19
Agreement Number:	16-HPAC-00242
Name and Address of Recipient:	Old Massett Village Council PO Box 175 Masset, BC V0T 1M0
Amount of Approved Contribution:	\$88,000

Reporting period: from: February 4, 2019 to March 1, 2019

<b>Type of report:</b>	<b>Purpose of report:</b>
<input checked="" type="checkbox"/> Progress Report	<input checked="" type="checkbox"/> Request for advance payment
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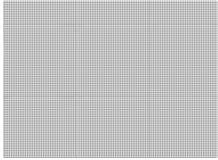
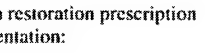
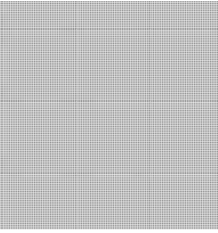



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#### Section 4 - Confirmation

I hereby confirm that the information provided in this report, including all attachments, is accurate to the best of my knowledge and that I am authorized to sign this report on behalf of the Recipient.

**Option 1: Hard copy signature**

Name: Donald Edgars  
Position: Chief Councillor

Signature: Donald Edgars Date: March 13, 2019

**Option 2: Electronic - check box**

☐ I have read and agree with the above statements

Name: \_\_\_\_\_  
Position: \_\_\_\_\_ Date: \_\_\_\_\_

**Nutton, Byron**

---

**From:** Thorpe, Suzanne  
**Sent:** 2019–March-13 6:47 PM  
**To:** Nutton, Byron  
**Subject:** Compiled initial comments based on my discussions with AJ and MM

Some considerations/ thoughts after discussions with AJ/ Murray (internal communications):

- Tidal salt marsh/ tidal flats were extensive in the area historically – such habitats are probably the most limiting habitat of the area’s habitat types and a re-focus on restoration of such habitats is recommended by both AJ and MM. There may also be a key upland component being missed related to GW discharge/ upwelling from upland areas, and that could be used as design elements if re-establishment of salt marsh/ tidal flats were to be more broadly considered. AJ made this suggestion when we earlier walked out there and I confirmed there is evidence of upland seepage/ GW channel presence.
- Decoupling of the Centerm-HBA project(s) is difficult. The proposal from VFPA states that:
  - Habitat in the Northeast Basin will be created by beneficially using approximately 87,000 m3 of dredge material [REDACTED] and [REDACTED] approximately [REDACTED] Fraser River sand, or a suitable clean alternate (e.g., approved Sechelt sand), is proposed as the additional fill material. This imported material is anticipated to be placed over the dredge material from the Southwest Channel to form the upper sediment layer in the Northeast Basin. [REDACTED]
  - I see the Centerm’s offsetting as very different because the displaced habitat is predominantly, if not totally, subtidal mudflat. Accruing benefits to the marine/ intertidal/ foreshore landscape by way of relative habitat values makes more sense for large subtidal infill projects like that because it’s easier to see a net benefit based on the lower-value losses (as long as it makes proper sense based on the landscape used for offsetting; for Centerm this has been accepted by DFO already so it is not something to contemplate) ... in THIS case, however, we are being asked to bank habitat using [REDACTED] that a subtidal rock reef with algae and “functional improvements to flushing” has a higher relative productivity of 5 (on a rating scale of 5) than a intertidal area with high bivalve productivity/ kelp growth (and that is a habitat of limited supply in the area), and which was given a lower relative productivity rating of 3. Regardless of habitat “relative values” it just doesn’t make sense.
  - The conversion factors proposed for the rocky reef in the NE basin was also given a 3; the SW channel’s relative value of 5 is based on habitat plus WQ improvements/ residence time modelling (which may not be measurable). Per above, it just doesn’t make sense.
  - With regard to total tidal residence times – as mentioned, it would be useful to see the modelling – AJ and MM both expressed concern that there is no justification that the rate of tidal flushing is a limiting factor or that any improvements are of any (measureable) benefit.



- Questionable benefits regarding the addition of rock riprap in subtidal/ intertidal areas – concern that this type of habitat in these areas is unlikely to be of any benefit especially for projects that result in a loss of an already highly impacted habitat type in Vancouver Harbour. AJ/MM indicate this should not be a restoration objective even with the “productivity benefits” as described.
- As I had earlier indicated to you, and Murray also aptly pointed out, it’s difficult to consider that this would be optimal rockfish/ lingcod habitat, even at depth, based on the other habitats existing in the inlet (could be some use by juveniles (?)); why, when other more extensive habitats would be preferred. AJ also suggested that this type of reef may even just end up being a ‘hot spot’ for predators.
- Impacts to the SE channel itself (highly productive). AI suggests that there may be impacts from the widening of the SW channel on sediment transport (sand and shell hash) that haven’t been considered, and as well that the cutting of a much larger SW channel may have the potential to reduce flows in the SE channel that may be critical to kelp production in that area. He indicates that there is likely a tidal velocity requirement for kelp. He suggests that all else being equal, the velocity through the new channel will be inversely proportionate to the ratio of channel cross-section to the volume of the inlet it is filling. That is to say, as the channel gets larger, the tidal velocity through it will decline. By digging the SW channel 40m wide at the base (top width 60m?) to obtain fill material, it is likely that the sought after tidal currents would be decreased, especially given that the SE channel will continue to convey flow. And the SE channel would also be likely to aggrade with fines as scour velocities decline. Murray also suggested that the constructed rock reef would seem likely to be a net deposition zone and isn’t likely to function over time, and this has been experienced with other built wide, rock-lined channels.
- We should have the AECOM design drwgs and modelling if they are substantially or partially complete already.
- What about contaminant assessment work (woodwaste, upland fill – any leachate?).

As a final note, additional rationale for NOT accepting the Maplewood Marine Restoration Project is that the Authorization’s Section 6 checklist indicates that there are uncertainties in developing and implementing the offsetting measures – the “uncertainties are: the success of proposed eelgrass transplants and colonization of created intertidal flat habitat and rocky reef is uncertain”. When there is discussion w/ Sr. Mgmt about the proposed HBA – we could point to these uncertainties and indicate that we are hesitant to continue to build habitat when are uncertain about whether there will be measurable success.

### **Suzanne Thorpe**

Partnerships, Standards and Guidelines/ Partenariats, normes et lignes directrices

Fisheries Protection Program/ Programme de protection des pêches

Ecosystem Management Branch / Direction de la gestion des écosystèmes

Fisheries and Oceans Canada (DFO), Pacific Region/ Pêches et Océans Canada, Région du Pacifique

Government of Canada/ Gouvernement du Canada

200-401 Burrard Street, Vancouver BC V6C 3S4 (13<sup>th</sup> Floor)/ 401 Burrard Street, bureau 200, Vancouver (C.-B.) V6C 3S4

Telephone: (604) 666.3512 or Mobile: [REDACTED]

**Nutton, Byron**

---

**From:** Heather Leschied [REDACTED]  
**Sent:** 2019-March-13 8:49 PM  
**To:** Nutton, Byron; Mah, Jordan  
**Cc:** Cooper, Tola  
**Subject:** SHIM in the Columbia Basin & CNFASAR EOI

Hello Byron and Jordan,

Tola Cooper has connected me with the two of you regarding our proposal for the CNFASAR EOI for our project, **Sensitive Habitat Inventory Mapping and Shoreline Development Guidance for Species at Risk in the Columbia Basin**. Byron, you and I have connected previously about this project, and the available funds through CNFASAR is now very timely.

The work that is being proposed will be a collaboration of the Kootenay Lake Partnership, government agencies involved in the East Kootenay Integrated Lake Management Partnership, environmental consultants using SHIM (ie. EcoScape Environmental), as well as Bruce MacDonald and [REDACTED] Living Lakes Canada will facilitate and manage the project.

Since 2008, SHIM has been completed for 13 lakes in the Columbia Basin. The objectives of the proposed project are:

- a) Integrate technological advances and improvements to the methodology/data dictionary and data storage and access
- b) Re-SHIM priority lakes based on development pressures and presence of species at risk, and assess the rate of change over time / shoreline habitat loss (which has been done now on Okanagan Lake)
- c) Incorporate pre-contact archaeological and First Nations cultural values layers as they pertain to species at risk

With new projects now complete including Kootenay Lake, and most recently Brilliant Headpond, members of the Kootenay Lake Partnership and East Kootenay Integrated Lake Management Partnership have expressed interest in re-engaging with Fisheries and Oceans Canada, and are hoping that this project, along with recent changes to legislation will create the space for this. As you may be aware from [REDACTED] DFO initially started the partnership and brought SHIM to the Columbia Basin via [REDACTED] and Bruce MacDonald. Would it be appropriate to include DFO as a collaborator in this project going forward?

I am happy to provide any additional information as necessary.

Kind regards,  
 Heather

Heather Leschied  
 Operations Director  
 Living Lakes Canada

Nelson, BC  
[www.livinglakescanada.ca](http://www.livinglakescanada.ca)  
c: [REDACTED]



Living Lakes Canada facilitates collaboration in education, monitoring, restoration and policy development initiatives for the long-term protection of Canada's lakes, rivers, wetlands and watersheds.

Publicly available at: <http://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=...>

Ministry of Environment

EcoCat: The Ecological  
Reports Catalogue



## Report: Okanagan Lake Foreshore Inventory and Mapping (FIM) 2016 Update Report

### Report Documents

- [Okanagan Lake  
Foreshore  
Inventory and  
Mapping 2016  
Update Report](#)  
Update Report  
(pdf/8.6 Mb)

Okanagan Lake is one of, if not the most important feature of our region. The lake is a significant revenue source because it supplies key services such as tourism, recreation, and agriculture, and supports our cities and rural areas in numerous ways. The lake also provides key environmental services such as fish and wildlife habitat, drinking or irrigation waters for many valley residents, and flood and drought protection.

**Author:** Ecoscape Environmental Consultants Ltd.

**Old Reference Number:** 16-1880

### Map Plotfiles

- [FIM\\_AHI  
Shapefiles](#)  
(zip/4.1 Mb)
- [Geodatabase FIM](#)  
(zip/1.2 Mb)
- [Layer Files](#)  
(zip/58.6 Kb)
- [Map Package](#)  
(zip/3.8 Mb)
- [Photo Shapefiles](#)  
(zip/247 Kb)

**Date Published:** Apr 2017

**Report ID:** 52566

**Audience:** Government and Public

Regulators at all levels of government and the general public are becoming increasingly aware of the importance of managing our watersheds in a sustainable manner. Land owners and the general public are often concerned and may not understand how their activities influence shoreline condition, or understand how shoreline management is being undertaken. For these reasons, an update to the FIM mapping of Okanagan Lake was undertaken as recommended. The Okanagan area has acted as a catalyst for initial shoreline mapping exercises, and continues the progressive leadership role with this inventory and report.

### Data Files

- [Excel FIM\\_AHI  
Database](#)  
(zip/320.7 Kb)

#### Report Type

Fish and Aquatic Habitat Information

#### Subject

Fish and Fish Habitat - Habitat and Stream Assessment

Region - Okanagan

Watershed Groups - 310 - Okanagan

### Digital Map Files

- No files of this type available

### Image Document

**Pages 958 to / à 959**  
**are public-denied pursuant to section**  
**est public-refusé en vertu de l'article**

**68(a)**

**of the Access to Information Act**  
**de la Loi sur l'accès à l'information**

## Nutton, Byron

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**From:** Olson, Charlotte <Charlotte.Olson@portvancouver.com>  
**Sent:** 2019-March-14 6:48 AM  
**To:** Nutton, Byron; Thorpe, Suzanne  
**Cc:** Scott Northrup; Ruffo, Gord  
**Subject:** Thursday March 14 Call w VFPA - Agenda  
**Attachments:** 2019-03-14-03-600-VFPA-AGENDA-VFPA and DFO Liaison Meeting\_No 54-Rev0.docx;  
2019-03-07-03-600-VFPA-HEP-DFO Meeting Actions-Rev0.docx

Hi Byron and Suzanne,

Ahead of our conference call today (11:30am), please find attached

1. Agenda to guide the call
2. Actions List – from our last call on March 7

Call number is in the Outlook invite, but just in case:

- +1-604-449-3026 (Vancouver)

- [REDACTED]

Regards,  
Charlotte

**Charlotte Olson** P.Geo., PMP  
Manager, Infrastructure Habitat Development



**Vancouver Fraser Port Authority**  
100 The Pointe, 999 Canada Place  
Vancouver, B.C. Canada V6C 3T4

P: 604.665.9590 | CELL: [REDACTED]  
[portvancouver.com](http://portvancouver.com)

**Habitat Enhancement Program****DFO / VFPA Liaison Meeting:  
Conference Call – March 2019**

Meeting No. 54

**Location:** Conference Call (VFPA Vancouver Meeting Room)

**Date:** Thursday March 14<sup>th</sup> (11:30 AM)

<b>Attendees:</b>	Byron Nutton (DFO)	Charlotte Olson (VFPA)
	Suzanne Thorpe (DFO)	Gord Ruffo (VFPA)
		Scott Northrup (HEM/VFPA)

**AGENDA:**

- 1. Review of Agenda**
- 2. Project Confirmation – Discussion**
- 3. Final Steps to Execute Arrangement - Status**
  - a) VFPA to receive Executive approval and signatures first
  - b) VFPA to send original copy of final signed Arrangement to DFO to sign/execute
  - c) DFO to send final executed original Arrangement back to VFPA
- 4. Next Steps/Actions**

**MEETING SUMMARY/ACTIONS: DFO/VFPA Liaison Meeting – Conference Call**
**DATE:** March 7, 2019 (10am Call)

**LOCATION:** Conference Call - VFPA Office (Vancouver Room)

**NEXT MEETING – March 14 (11:30am Conference Call)**
**ATTENDEES:**
**DFO Representatives:**

Byron Nutton (BN), DFO  
Suzanne Thorpe (ST), DFO

**Habitat Enhancement Program/VFPA Representatives:**

Gord Ruffo, VFPA (GR); Charlotte Olson, VFPA (CO); Jemma Scoble (JS)

**CURRENT MEETING ACTIONS (STATUS – after March 7/19 Call):**

No.	DESCRIPTION:	ACTION BY:	DUE DATE:	COMMENTS:
<b>2019 Actions:</b>				
1.	Following March 5 meeting btw DFO and TWN, Byron to send Amanda King (TWN) a copy of current final version of VFPA-DFO Arrangement	DFO (BN)	March 8	BN/ST met with TWN on March 5. On March 7 BN asked VFPA of any concerns in sharing the current final draft Feb 21/19 version of Arrangement with TWN, VFPA confirmed no concerns on March 7, BN to send to TWN ASAP.
2.	Following March 5 meeting btw DFO and TWN, VFPA (JS) to send TWN a copy of the final Indigenous Engagement Summary Report	VFPA (JS)	Target by March 15, or following week	JS to send out to TWN when final report is sent out to all IGs.
3.	BN requested VFPA prepare and provide a summary engagement/consultation log for Squamish Nation related to the Arrangement	VFPA (CO/JS)	Target by March 15	JS to prepare the Squamish summary/engagement log and provide to CO to send to DFO.
4.	VFPA to finalize and sign final VFPA-DFO Arrangement, and send to DFO (Cheryl Webb) for signature	VFPA (CO) DFO (BN)	ASAP (by March 31)	On March 7 DFO (BN) confirmed VFPA could finalize Arrangement, and proceed with contract preparation for signature of Robin Silvester, followed by execution by Cheryl Webb.



No.	DESCRIPTION:	ACTION BY:	DUE DATE:	COMMENTS:
5.	<p>VFPA to provide DFO a Project Confirmation document for the proposed Maplewood Marine Restoration Project (e.g. habitat banking component)</p> <p>DFO to review &amp; discuss on March 14</p>	VFPA (CO)	<p>March 11</p> <p>Call on March 14</p>	<p>VFPA is currently still working with TWN to prepare a joint submission to DFO on this aspect. The submittal will include the MMRP Project Confirmation Document, as well as supporting document entitled MMRP QEP Assisted Assessment.</p> <p>Call setup for 11:30am on March 14 to discuss.</p>

## Nutton, Byron

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**From:** Ko, Christina  
**Sent:** 2019–March-14 8:39 AM  
**To:** Hwang, Jason; Nutton, Byron  
**Subject:** OFFICER: VFPA Habitat Bank Arrangement  
**Attachments:** 2019-03-08\_VFPA\_HBA\_BN\_for\_Decision\_DRAFT.docx; 2019-02-21 Final Draft VFPA-DFO Habitat Bank Arrangement.pdf; 2019-02-01 DFO-VFPA Arrangement-IG Consultation Summary RPT-Rev0-FINAL DRAFT.pdf

Good morning Jason and Byron

I'm filling this BN. Who should I put down as the Officer?  
Thanks!

Christina Ko

**From:** Fanos, Brad <Brad.Fanos@dfo-mpo.gc.ca>  
**Sent:** Tuesday, March 12, 2019 2:41 PM  
**To:** Ko, Christina <Christina.Ko@dfo-mpo.gc.ca>  
**Subject:** FW: VFPA Habitat Bank Arrangement

thanks

**From:** Hwang, Jason <[Jason.Hwang@dfo-mpo.gc.ca](mailto:Jason.Hwang@dfo-mpo.gc.ca)>  
**Sent:** March-12-19 2:40 PM  
**To:** Fanos, Brad <[Brad.Fanos@dfo-mpo.gc.ca](mailto:Brad.Fanos@dfo-mpo.gc.ca)>  
**Cc:** Nutton, Byron <[Byron.Nutton@dfo-mpo.gc.ca](mailto:Byron.Nutton@dfo-mpo.gc.ca)>; Thorpe, Suzanne <[Suzanne.Thorpe@dfo-mpo.gc.ca](mailto:Suzanne.Thorpe@dfo-mpo.gc.ca)>  
**Subject:** FW: VFPA Habitat Bank Arrangement

Hi Brad. VFPA package attached in this email. Byron and Suzanne have done a great job keeping this on track and steering towards an outcome that works for everyone. Note the overview comments provided by Byron in the covering email below. If you have questions let us know. Jason

**From:** Nutton, Byron <[Byron.Nutton@dfo-mpo.gc.ca](mailto:Byron.Nutton@dfo-mpo.gc.ca)>  
**Sent:** March-12-19 12:42 PM  
**To:** Hwang, Jason <[Jason.Hwang@dfo-mpo.gc.ca](mailto:Jason.Hwang@dfo-mpo.gc.ca)>  
**Cc:** Thorpe, Suzanne <[Suzanne.Thorpe@dfo-mpo.gc.ca](mailto:Suzanne.Thorpe@dfo-mpo.gc.ca)>  
**Subject:** VFPA Habitat Bank Arrangement

Jason, as discussed please see the attached updated draft Briefing Note, and "final drafts" of the Arrangement and the Engagement Summary.

The Briefing Note still requires file numbers on page 1, file numbers and additional information in the footer on pages 2-4, and the routing slip (page 5) needs to be completed – my understanding is that Christina Ko can do that stuff.

**Please note that in reference to our engagement with Tsleil-Waututh, in follow-up to our March 5<sup>th</sup> meeting I am expecting written confirmation that they have no outstanding concerns but have drafted the Briefing Note as final in anticipation of receiving that confirmation.**

The copy of the Arrangement is for review and information only – the copy to be signed is making its way through the VFPA sign-off process and will be delivered to Cheryl for final counter signature.

The Engagement Summary Report will be finalized and sent out to the participating Indigenous groups this week – the attached copy is the draft we circulated to participants for comment and to date we have not received any feedback that require changes.

With respect to the discussion points from our Feb 27 meeting with Brad:

- Term of Arrangement and 5-year review: I confirmed that the conditions related to the term and the review (and the entire arrangement overall) are consistent with the template provided in the guidance document. I reviewed the Briefing Note and confirmed that the use of the template is mentioned in the Summary box and again, this time with specific reference to the term and the 5-year review, in the Strategic Considerations section.
- Authorship of Engagement report: I confirmed with VFPA that cover page of final Engagement summary report (to be sent to Indigenous groups this week) will be the same as the final draft version attached, as opposed to being on VFPA letterhead, and I note that joint authorship is confirmed in Section 1: Overview.
- Squamish engagement: I am expecting a summary from VFPA on any additional attempts to engage with Squamish for our records, but it will not affect the outcome/adequacy of the engagement to date.

Let me know if you need anything further.

*Byron Nutton, RPBio*

A/Team Lead | Chef d'équipe Intérimaire  
Partnerships, Standards and Guidelines | Partenariats, Normes et lignes directrices  
Fisheries Protection Program | Programme de protection des pêches  
Fisheries and Oceans Canada | Pêches et Océans Canada  
Pacific Region | Région du Pacifique

250-618-4268

**Pages 966 to / à 1021**  
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## Nutton, Byron

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**From:** Hardacre, Kim  
**Sent:** 2019-March-14 11:24 AM  
**To:** Goodwin-Ruch, Steven; True, Eric  
**Cc:** Runciman, Bruce; Lyen, Ron; Nutton, Byron  
**Subject:** 18-HSP-8315 Nechako White Sturgeon Recovery Initiative: Lapsed Funding

Hello,

I had a conversation this morning with Michelle Roberge who is the project manager for the NWSRI.



Regards,  
Kim Hardacre

A/Partnerships Coordinator / Coordonnateur des partenariats  
Fisheries Protection Program / Programme de protection des pêches  
Ecosystem Management Branch / Direction de la gestion des écosystèmes  
Fisheries and Oceans Canada, Pacific Region / Pêches et Océans Canada, Région du Pacifique  
Government of Canada / Gouvernement du Canada  
200-401 Burrard Street, Vancouver BC V6C 3S4 / 401 Burrard Street, bureau 200, Vancouver C.-B. V6C 3S4  
E-mail [Kim.Hardacre@dfo-mpo.gc.ca](mailto:Kim.Hardacre@dfo-mpo.gc.ca) / Tel: (604) 666-0130 / Cell: (604) 347-8907

## Nutton, Byron

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**From:** Hardacre, Kim  
**Sent:** 2019–March-14 5:31 PM  
**To:** Lyen, Ron; Goodwin-Ruch, Steven  
**Cc:** True, Eric; Runciman, Bruce; Nutton, Byron  
**Subject:** 18-HSP-8315 Nechako White Sturgeon Recovery Initiative: Amendment Request  
**Attachments:** HSP 8315-reallocation.docx; SQ16149.pdf

Hello Ron and Steven,

Further to my email of earlier today, I have received a request to amend the subject HSP agreement.



Best regards,  
Kim Hardacre

A/Partnerships Coordinator / Coordonnateur des partenariats  
Fisheries Protection Program / Programme de protection des pêches  
Ecosystem Management Branch / Direction de la gestion des écosystèmes  
Fisheries and Oceans Canada, Pacific Region / Pêches et Océans Canada, Région du Pacifique  
Government of Canada / Gouvernement du Canada  
200-401 Burrard Street, Vancouver BC V6C 3S4 / 401 Burrard Street, bureau 200, Vancouver C.-B. V6C 3S4  
E-mail [Kim.Hardacre@dfo-mpo.gc.ca](mailto:Kim.Hardacre@dfo-mpo.gc.ca) / Tel: (604) 666-0130 / Cell: (604) 347-8907

**From:** NWSRI Coordinator <[info@nechakowhitesturgeon.org](mailto:info@nechakowhitesturgeon.org)>  
**Sent:** 2019–March-14 11:56 AM  
**To:** Hardacre, Kim <[Kim.Hardacre@dfo-mpo.gc.ca](mailto:Kim.Hardacre@dfo-mpo.gc.ca)>

Cc: [REDACTED]  
Subject: HSP 8315

Hello Kim,

As per our conversation today, please find attached a letter outlining our request regarding the remaining funds for the HSP 8315 project.

Please let me know if you need anything further to somehow maybe release some of the funds to help pay for the PIT tag readers for the Boat Kit Program.

Sincerely,

Michelle

--

Michelle Roberge  
*NWSRI Coordinator*

C: [REDACTED]  
E: [info@nechakowhitesturgeon.org](mailto:info@nechakowhitesturgeon.org)  
W: [www.nechakowhitesturgeon.org](http://www.nechakowhitesturgeon.org)  
PO Box 710, Vanderhoof, BC, V0J 3A0



## HSP 8315 – Emergency Boat Kit Program Assessment and Engagement

### Background:

The Nechako White Sturgeon Recovery Initiative's (NWSRI) promotes the recovery of the SARA-listed endangered Nechako white sturgeon. The Emergency Sturgeon Release Boat Kit Program is one harm reduction program of the NWSRI that continues to reduce white sturgeon by-catch and mortality associated with the First Nations Food, Social and Ceremonial salmon, char and ling cod fisheries. The Emergency Sturgeon Release Boat Kit Program has been successful with 71 live released sturgeon since the pilot program in 2011. By mitigating the threat to white sturgeon that is caused by human activities the Boat Kit project aligns with the regional priorities set out by the Habitat Stewardship Program. The Boat Kit program provides an immediate reduction in sturgeon mortality.

### Objectives:

The original purpose of the HSP 8315 project was to:

1. Review and assess the current Emergency Sturgeon Release Boat Kit Program to provide recommendations on how effective the program is relative to the potential of the program, and what improvements can be made to increase the effectiveness and outreach of this program to the First Nation communities within the Nechako White Sturgeon range.
2. Promote the Emergency Boat Kit Program within the seven First Nation Communities that normally participate in the program through direct engagement with Chief and Council, Catch Monitors, Fisher Families and general community members.

### Project Summary:

NWSRI and CSTC were successful in hiring a consultant to carry out this project. The consultant completed a portion of the evaluation component of the project, by doing background research on the program and interviewing members of the program as was outlined in the project description.

The issue we have is that the contractor stopped work on the project after the first invoice was paid, and we have had no contact with the contractor for over a month. The NWSRI and CSTC project leads worked to find a replacement. Our efforts to find a replacement have been unsuccessful, and the remaining components of the project will not be completed by March 31, 2019.

To date \$1,990.90 of the HSP funds have been spent. Matching funds for this amount come from NWSRI for Administration and Members participation in the project, and CSTC Administration and Travel support.

### Remaining Funds:

There are \$8,1991.10 of HSP funds remaining on this project, as well as some funds from the Canfor donation (\$1,000). The NWSRI and CSTC would like to request that the remaining HSP funds be reallocated to support the purchase of PIT tag readers for the Boat Kit Program.

It has been identified through this project and conversations with Boat Kit Monitors that there are too few PIT tag readers available within the various communities to adequately scan each sturgeon that is encountered. There are seven First Nation communities involved with this project, with multiple fisher families/fishing boats per community. Presently, we have less than one PIT tag reader per community, and no new PIT tag readers have been purchased for this project in over three years. We are requesting that a portion of the remaining HSP funds, with matching funds, be used toward the purchase of ten new PIT tag readers. Ten new PIT tag readers, with the four we currently have, would give us two readers per community.

### *Reasons for new PIT tag readers for Boat Kit Program:*

- Currently, PIT tag readers are most often not get taken on fishing boats with the rest of the kit because there are too few per community, and therefore there is reduced opportunity to collect the PIT tag data if a sturgeon is encountered. A part of the Boat Kit Program is to support research of the NWSRI Technical Working Group (TWG), and this support has been lacking in the past few seasons due to the lack of PIT tag readers for the overall program.
- There are now hatchery release sturgeon that are starting to enter the size range that is susceptible to gill net capture and PIT tag data is becoming more and more important (eg. 2018 gill net mortality of a hatchery sturgeon named 'Cupcake' – because it had died the Boat Kit Monitor was able to source a PIT tag reader to check the fish. This information was very valuable to the TWG.
- There is a new focus by the NWSRI TWG to better understand the dispersal and movement patterns of all sturgeon, especially of hatchery sturgeon. PIT tag data that relate specific fish to location and general condition, is lending support towards other research into genetics, habitat selection, competition, etc.

- The NWSRI TWG is considering switching to new PIT tags for the coming years, which the current Boat Kit Program readers will not be able to detect. Purchasing new 'dual' readers would negate that problem for the future.

*Cost:*

The cost of 10 new readers. The total cost would be:

\$7,000 + shipping \$224.63 = \$7,224.63

Please see the attached Quote from Biomark.

*Matching funds:*

Canfor – potential for up to \$2,500

NWSRI Donations – Potential for \$650

CSTC Admin – \$250.00

NWSRI Admin – \$225.00

**Biomark, Inc.**  
705 S. 8th Street  
Boise, ID 83702  
Phone: 208-275-0011  
Fax: 208-275-0031  
**[www.biomark.com](http://www.biomark.com)**



## QUOTE

Sell To: CARRIER SEKANI TRIBAL COUNCIL

1460 6TH AVENUE, #200  
PRINCE GEORGE, BC V2L 3N2  
CANADA

Ship To: CARRIER SEKANI TRIBAL COUNCIL

1460 6TH AVENUE, #200  
PRINCE GEORGE, BC V2L 3N2  
CANADA

QUOTE NO.		SHIP VIA	TERMS	SALES PERSON	SALES QUOTE DATE	
SQ16149		FEDEX E	Net 30 Days	EP	03/12/19	
QTY	ITEM NO.	DESCRIPTION			UNIT PRICE	TOTAL PRICE
10	HPR.LITE.01V1	Biomark HPR Lite Reader			700.00	7,000.00
		Includes: Power Supply, Comm. Cable,			0.00	
		Test Tag, Case, Test Tag, Flash Comm. Cable			0.00	
		HPR Lite includes Biomark Tag Manager Software			0.00	
		This software requires an activation key prior to			0.00	
		use. Software is delivered via download from			0.00	
		our website. Once you have downloaded the			0.00	
		software and opened it for the first time your			0.00	
		PC will generate a computer ID number.			0.00	
		Please call (208) 275-0011 or email			0.00	
		customerservice@biomark.com with this			0.00	
		ID number to receive your activation			0.00	
		key code. (1) Activation key per reader			0.00	
		purchased will be provided.			0.00	
		You will need to provide this invoice number			0.00	
		Thank you.			0.00	
1		Shipping and Handling, FED EX INTL ECON			224.63	224.63
		(5 BOXES)			0.00	
					0.00	
					0.00	
		CANADIAN \$ : \$9645.24			0.00	
		PAYMENT MUST BE MADE IN U.S. FUNDS			0.00	
		3.5% ADDED FOR CREDIT CARD PURCHASE			0.00	
		OVER \$5,000 U.S.			0.00	

All returns require prior approval and may be subject to a 20% restocking fee.  
Returns or refunds cannot be issued on project related purchases, special or custom orders, or partially used full vials.

All sales are final for tags sold in partial vials.

Biomark's standard warranty of 12 months applies to all purchases. Visit [www.biomark.com](http://www.biomark.com) for details.

Prices, taxes, shipping and handling fees are subject to change if any part of this order is modified.

Any applicable taxes will be charged for orders shipping to Idaho, Washington, Utah and Minnesota.

Quotes and orders are good for 30 days from date of document.

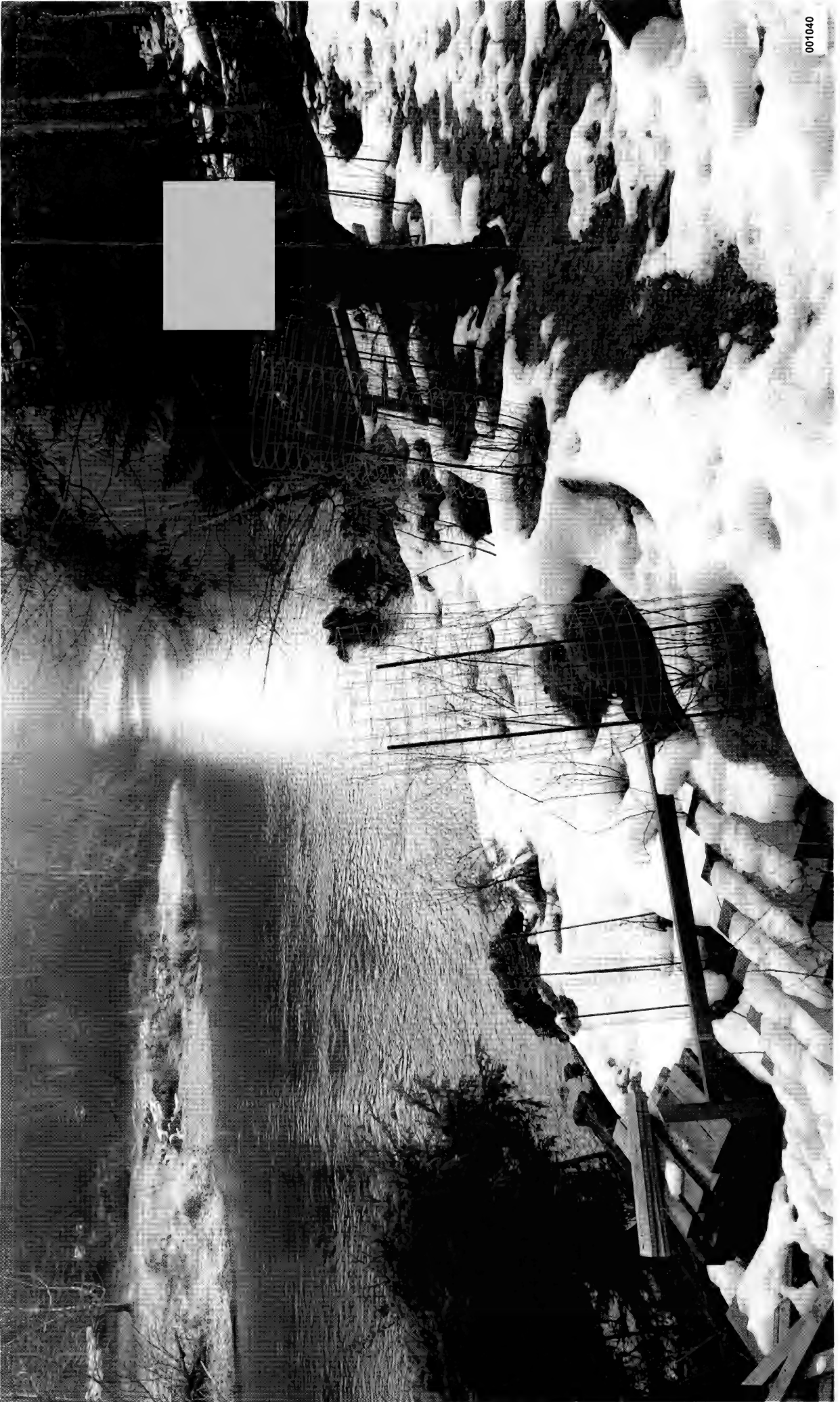
A 1.5% per month finance charge will be applied to past due accounts.

<b>QUOTE AMOUNT</b>	7,224.63
<b>TAXABLE TOTAL</b>	0.00
<b>SALES TAX</b>	0.00
<b>TOTAL QUOTE</b>	7,224.63
<b>FEIN: 82-0438042</b> <b>CHECKS MUST BE IN U.S. FUNDS DRAWN ON A U.S. BANK</b>	

**Pages 1029 to / à 1034**  
**are duplicates**  
**sont des duplicatas**

**Pages 1035 to / à 1038**  
**are not relevant**  
**sont non pertinentes**

**Page 1039**  
**is a duplicate**  
**est un duplicata**



## Nutton, Byron

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**From:** Thorpe, Suzanne  
**Sent:** 2019-March-14 12:35 PM  
**To:** Nutton, Byron  
**Subject:** DRAFT typed internal notes from conversation today  
**Attachments:** 2019-03-14-03-600-VFPA-AGENDA-VFPA and DFO Liaison Meeting\_No 54-INTERNALnotes.docx

I try not to take notes like this very often and these draft notes are meant to only be for our use and review of the conversation. IF we need something drafted for record – we can just take the main points from this and fill in the blanks since I couldn't capture absolutely everything in the conversation.

### Suzanne Thorpe

Partnerships, Standards and Guidelines/ Partenariats, normes et lignes directrices  
Fisheries Protection Program/ Programme de protection des pêches  
Ecosystem Management Branch / Direction de la gestion des écosystèmes  
Fisheries and Oceans Canada (DFO), Pacific Region/ Pêches et Océans Canada, Région du Pacifique  
Government of Canada/ Gouvernement du Canada  
200-401 Burrard Street, Vancouver BC V6C 3S4 (13<sup>th</sup> Floor)/ 401 Burrard Street, bureau 200, Vancouver (C.-B.) V6C 3S4  
Telephone: (604) 666.3512 or Mobile: (604) 312.7964



**Habitat Enhancement Program****DFO / VFPA Liaison Meeting:  
Conference Call – March 2019**

Meeting No. 54

**Location: Conference Call (VFPA Vancouver Meeting Room)**

**Date: Thursday March 14<sup>th</sup> (11:30 AM)**

**Attendees:**

Byron Nutton (DFO)  
Suzanne Thorpe (DFO)

Charlotte Olson (VFPA)  
Gord Ruffo (VFPA)  
Scott Northrup (HEM/VFPA)

**AGENDA:**

- 1. Review of Agenda**
- 2. Project Confirmation – Discussion**

CO – confirmation is not to land on details of banked area but meant to land on the current agreement requirements prior to going through construction requirements

BN – struggling with the proposal – hard time understanding SW channel merits of excavation of intertidal to deep, rock-lined channel that it is anything other than bad for fish in an area that already has a lot of subtidal rock. Intertidal limited to MF, Port Moody and Indian River is about it. In the broader context of the inlet

CO - 95ha of the flats is there

VN – suggests lots anthropogenic rock is already in Burrard Inlet

SN – 5 years ago, offsetting presented, tied together to create better conditions in main basin with other habitats – main basin concepts included and the whole-of-project rationale is being presented

BN- again, about NE portion – pieces to deal with individually. SW channel as a “footprint” area maybe evens out but the habitat values there now are DIFFERENT but have a hard time with the fact that they may be better – in the context of Burrard Inlet – can’t find the positivity.

CO – have you reviewed the concepts in their entirety?

BN – yes, high level review of concepts – can’t come to any other determination – has said before, has a hard time being convinced that this channel is of additional benefit. Channel alone, and aside from main basin is this a benefit?

CO - have to look at benefits of flushing in main basin at the same time.

BN – as stand-alone project need to agree that this doesn’t make sense

GR – staged delivery – main basin probably will never get built without the SW channel so need to look at overall project – doesn’t make sense just from a SW channel perspective but

BN – no certainty with main basin

CO – modelling results will result in flushing improvements of 15% in main basin; fringing eelgrass habitat will be improved in main basin = fisheries productivity benefits in main basin.

BN- saying benefits will come in future but not saying what those are in the future, In terms of bigger basin in terms of flushing rates main basin exchanges – every tide exchanges.

CO – 60% design report 7.4hrs to 3.1 hrs flushing. Have coastal modelling results – tidal cycles included in the Authorization materials.

BN – where is biological rationale that says the current exchange is somehow limiting the productivity in there

CO – Section 10 of application for Centerm (anoxic conditions in basin); referenced this in confirmation. Makes NE basin optimal for restoration because of opportunities for increased flow. Stagnancy of water flow.

BN – suggests we will review this information but if tidal cycles exchange this water

CO – HEAT map provided pre- and post- predictions on residence time (modelling)

BN – longest term is 11 hours (High tide to high tide).

CO – supplements submitted to ME – ample information out there. If we are down to negotiating a balance for the SW channel – TWN is supportive of the work to be done on the SW channel and the future values of the main basin associated with this.

BN – can look for biological rationale on residence time but reasons questioned water quality yesterday - talk about flushing time and water quality improvements by the flushing of the main channel – we are trying to understand how this will be solved by tidal exchange – but no water quality sampling completed so how do we find that WQ will be improved.

SN - Improved oxygenation in basin and with wood-waste material in there it will accelerate recovery of those areas. Increased flushing FW will be passed back and forth in basin.

CO - (p.3) talks about benefits of tidal flushing – qualitative perspective. Can dig into this more. But we did provide what the QEP team proposed, sediment sampling undertaken.

BN – divide into chunks – divide into CHANNEL itself (adverse impact?) – how to rationalize that with improved WQ and tidal flushing.

CO – qualitative assessment along with coastal modelling report; proposing a salvage of life in the channel as well.

BN – talking about LOSS of the intertidal habitat when there isn't a lot of habitat there.

CO – asks if we aren't considering the reef habitat assoc. w/ the main basin

BN – talking about losing high value habitat that is currently limiting (in footprint area) of Burrard Inlet – a lot of riprap shoreline exists

SN – if talking about this in isolation, we are probably not talking about a trade

CO – asks where from here

BN – says we can look at this in more detail, and provide more detailed response but his response may not be much different.

CO – should we consider submitting this to Triage then? Been working with TWN for past 2 months on this to negotiate the credits.

BN – to be clear – SW channel is NOT part of authorized works under Centerm.

CO - Part of the Authorization application, and was included in the description and this was a part of the application as a whole – included in the supplemental information w/r/t offsetting as a habitat bank.

BN – at that time, we advised that the SW channel project was probably not a good candidate for the HB program.

CO – obviously you haven't had time to absorb and look at this.

BN – high level cut is that this part of the project should have been included in the Authorization as an impact related to the construction of the offsetting. Struggling with what information can be provided here that can convince us otherwise.

GR – somehow we need to improve flushing here – how do we do that

BN – is this something that is necessary to make this work? Is that what this is resting on to improve things biologically?

CO/SN – say included in Authorization

BN - point me to section of Application of Authorization where it states that the flushing will be so beneficial and that NE success rests on this as will future habitat banking works. Actual channel loss for some immeasurable, supposed beneficial habitat increases as well as habitat banking for other habitat impacts in Burrard Inlet – none of this points to the fact that this would be a bankable opportunity within the context of the habitat bank.

CO – suggests that we mentioned this would be a “wash” is that right?

BN – well, unknown but maybe ...

CO – then if 0 habitat bank value then we can do SE portion of channel even if it is a wash, right?

BN – moderately to highly productive value habitat – being lost or converted or changed to facilitate bank opportunities – why are we doing this? Context lost on habitat bank.

CO – have to look at entirety

BN – will do some research on what tidal flushing will be to this basin and see what the residence time benefits will be

CO – need to look at the function of the rock reef itself – there is 95ha of habitat there – and yes, there will be a change in habitat but the habitat will still be there – we need to take this conversation away and discuss with senior management, especially if the SW channel is considered to be an impact.

CO – feels provided with a bunch of information. Appendix K – happy to answer technical questions on that with the right folks in room

### **3. Final Steps to Execute Arrangement - Status**

- a) VFPA to receive Executive approval and signatures first
- b) VFPA to send original copy of final signed Arrangement to DFO to sign/execute
- c) DFO to send final executed original Arrangement back to VFPA

CO – HBA still working its way through the EXECUTIVE cycles and moving as fast as possible

BN – only thing from our end is needed an update on the FINAL version of the SUMMARY REPORT

CO – yes, prep work for the EA Report on T2

CO – log of SFN engagement this week and the FINAL summary report essential.

BN – notes our briefing report has gone up, but pending final pieces including letter from TWN, SFN, and final summary

### **4. Next Steps/Actions**

**Nutton, Byron**

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**From:** Runciman, Bruce  
**Sent:** 2019–March-14 12:42 PM  
**To:** Boutillier, Jaclyn  
**Cc:** Hardacre, Kim; Nutton, Byron  
**Subject:** RE: DFO Contact for habitat restoration questions

Good questions Jaclyn [REDACTED]

It would probably be easier to discuss this than try to capture all details in an email.

In briefest terms?

- [REDACTED] look at the Projects Near Water website (see: <http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>).
- There are provisions for restoration projects not requiring regulatory review on the working near water website and – generally speaking – if you’re at risk of causing serious harm while doing restoration work, then you’re probably doing it wrong.
- Planting alone for bank stabilization is generally wishful thinking for high energy sites. At a minimum, these would need some form of bioengineering (e.g. wattle fences), but more likely rock and log deflectors / groynes or revetments (which are likely a sensitive issue on the Cowichan River due to public use ... so reinforce the need / benefit of careful planning).
- If landowners / proponents don’t know how to plan / implement works in an effective way and/or without causing serious harm, then they should retain someone who does.
- SEP-RRU is an excellent technical resource, but has to be selective with their time and will likely focus on areas of highest value / need / benefit. Still they can be contacted directly (Dale Desrochers) or via the local CA (was Chantal Nessman, but you’d need to ask Dale who the current CA for that area is ... Byron may also know?).

Hope this helps. Happy to chat when you have time.

**From:** Boutillier, Jaclyn <Jaclyn.Boutillier@dfo-mpo.gc.ca>  
**Sent:** March 14, 2019 11:58 AM  
**To:** Runciman, Bruce <Bruce.Runciman@dfo-mpo.gc.ca>; Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Cc:** Hardacre, Kim <Kim.Hardacre@dfo-mpo.gc.ca>  
**Subject:** DFO Contact for habitat restoration questions

Hello Everyone,

I’m hoping to gain some insight from your years of expertise... ☺

I was on site with the BCCF yesterday looking at some of their restoration works for the Cowichan Shoreline Riparian Restoration (16-HPAC-00423). This project involves bioremediation in the form of like staking and planting native species along the riverbank on both private properties and parkland. We spoke with one of the landowners who said that for years he has been trying to deal with his severely eroding property line (apparently he has lost 40ft to the river). BCCF went in last year and planted / live staked the area; however, a flash storm ripped out a lot of the plants, including the land owners staircase. Apparently, this is no surprise and has been happening more frequently over the years due to climate changes. I’ve attached a photo of the property. Where we are standing is the high water mark for the river!

The lady from BCCF wanted to know what DFO's 'official position' was on habitat bank restoration, and what if any advice I could provide her on how best to advise these landowners on how to save their eroding properties. Basically, she was wondering if there was anyone that had more knowledge of the area / expertise in habitat stabilization techniques that she could talk to, to ensure they are on the right track.

My thoughts went to our DFO restoration unit, but wasn't sure who the local contact would be?

So, my questions to you are:

- [REDACTED]
- Is there someone I could put her in contact with; if so, who might that be?

Thank you to you both.

Kindly,

Jaclyn

**Pages 1047 to / à 1051  
are withheld pursuant to section  
sont retenues en vertu de l'article**

**19(1)**

**of the Access to Information Act  
de la Loi sur l'accès à l'information**

**Nutton, Byron**

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**From:** Committee Facilitator <Committee.Facilitator@hemmera.com>  
**Sent:** 2019–March-14 3:24 PM  
**To:** [REDACTED] Nutton, Byron; [REDACTED] Dennis Blake ; Elizabeth Harries ; [REDACTED]  
 Groenewoud, Taylor (EC); Hillary Hyland; Jack Smith ; [REDACTED]  
 [REDACTED] John Emery; [REDACTED] Katherine Marshall; Kevin Inouye ;  
 [REDACTED] Engelsjord, Michael; Michelle Bryant-Gravelle ; [REDACTED]  
 [REDACTED] Norma Powell; [REDACTED] Robert Bracken; [REDACTED] Scott  
 Lewis ; Tanya Martin; Seto, Vivian (Vancouver); [REDACTED]  
**Cc:** [REDACTED]  
**Subject:** Ridley Terminal Berth Expansion - No Prince Rupert meetings the rest of March 2019 -  
 #KITSUM 289; #METLA-PA-6550; DFO #18-HPAC-00245; TC # 2019-500061

Good afternoon,

Just adding clarity here: the March 18<sup>th</sup> meeting that was originally proposed is **no longer** on the schedule and we do not anticipate any meetings for the rest of the federal fiscal year – i.e., nothing for the rest of March.

Regards,  
 Darrell

Darrell Desjardin  
 Technical Committee Facilitator

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[Confidentiality Notice](#)

## Nutton, Byron

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**From:** Groenewoud, Taylor (EC) <taylor.groenewoud@canada.ca>  
**Sent:** 2019–March–14 4:12 PM  
**To:** Bryant-Gravelle, Michelle  
**Cc:** Inouye, Kevin; Jack Smith; Nutton, Byron; Norma Powell; Hodaly, Al (EC); Marshall, Kathryn (EC)  
**Subject:** RTI: ECCC second batch of comments on draft EEE  
**Attachments:** RTI\_EEE\_V3\_ECCC Cover Letter\_and\_Batch 2\_Comments\_FINAL.pdf

Hi Michelle,

Please find attached the second batch of ECCC's comments on version 3 of the draft EEE for the RTI berth expansion project (related to wildlife). As noted in the attached covering letter, at this time ECCC will not be making a determination on significance of adverse environmental effects; however, ECCC would require satisfactory responses to these comments if our role as a federal authority is confirmed. I have copied all other federal authorities for their consideration of ECCC's comments. Please copy me when these comments are circulated to the technical committee.

Cheers,  
Taylor

**Taylor Groenewoud MRM (Planning)**

Environmental Assessment Coordinator, P&Y Environmental Protections and Operations  
Environment and Climate Change Canada | Government of Canada  
[taylor.groenewoud@canada.ca](mailto:taylor.groenewoud@canada.ca) | Tel: 604-666-8342

Coordonnatrice de l'évaluation environnementale, Activités de protection de l'environnement P&Y  
Environnement et changement climatique Canada | Gouvernement du Canada  
[taylor.groenewoud@canada.ca](mailto:taylor.groenewoud@canada.ca) | Tél: 604-666-8342

*I acknowledge that I work, live and play on the unceded and traditional territories of the Musqueam, Squamish and Tsleil Wautuh First Nations.*





Environmental Protection Operations  
Environmental Stewardship Branch  
Pacific and Yukon  
201 - 401 Burrard Street  
Vancouver, BC V6C 3S5

March 14, 2019

PO Bag 8000  
Prince Rupert, BC  
V8J 4H3  
Canada

Dear Ms. Bryant-Gravelle:

**RE: Environment and Climate Change Canada's Comments on Version 3 of the draft  
Environmental Effects Evaluation for the Ridley Terminal Expansion Project**

Environment and Climate Change Canada (ECCC) has completed a review of Ridley Terminal Inc.'s (the Proponent) third version of the Environmental Effects Evaluation for the Ridley Terminal Expansion Project (the Project), provided to the department on February 5, 2019, in addition to the Appendices provided on February 15 2019.

ECCC provided a first batch of comments to RTI on March 7, 2019. The attached comment tables (Annex 1 and Annex 2) provide the second batch of ECCC's tabled comments. Annex 1 presents comments being provided by ECCC in its role as a federal department providing expert advice; ECCC would require satisfactory responses to these comments should it become a federal authority making a determination on significant adverse environmental effects that may result from the Project. Annex 2 includes information requests to assist in determining whether a permit under s.73 of the *Species at Risk Act* (SARA) may be required.

As previously communicated, at this time ECCC will not be making a determination on the significance of adverse environmental effects from the Project within the context of a disposal at sea permit. Further, ECCC's comments provided in Annex 2 indicate that there is currently not sufficient information provided in the EEE to determine if a permit under the SARA would be required for the Project. Given this uncertainty, for purpose of issuing of a SARA permit, ECCC's role as a federal authority making a determination on the significance of adverse environmental effects from the Project is unconfirmed. Therefore ECCC will not be making a determination of adverse environmental effects within the context of a SARA permit at this time.

Should new information become available that would support consideration of the dredge material for disposal at sea, or that would indicate that a SARA permit is required, then RTI would need to amend the environmental effects evaluation and reconvene the technical committee to address these issues; at that time, ECCC would make a determination on the significance of adverse environmental effects related to the Project.

Lastly, during the last technical committee meeting (March 7, 2019), members were seeking clarity on ECCC's role with respect to the Federal Policy on Wetland Conservation (FPWC). The federal government has developed the FPWC as a government-wide policy that aims to promote the conservation of Canada's wetlands in order to sustain their ecological and socio-economic functions, now and in the future. Wetlands are important to the maintenance of migratory bird populations and for the protection of species at risk, for which ECCC has a responsibility under the Migratory Birds Convention Act (MBCA), and the Species at Risk Act, respectively; as such, ECCC provides expertise and a lead role



Environment and      Environnement et  
Climate Change Canada      Changement climatique Canada

in support of FPWC implementation, but does not approve nor ensure implementation of Wetland Compensation Plans.

Thank you for providing the opportunity to comment. Please do not hesitate to contact me at 604-666-8342 if you have any questions or concerns.

Kind regards,

*[ORIGINAL SIGNED BY]*

---

Taylor Groenewoud  
Environmental Assessment Officer  
Attach. (2)



## Annex 1: ECCC's Comments on the Environmental Effects Evaluation for the Ridley Terminal Inc.'s proposed Ridley Berth Expansion Project

#	Topic	EEE section	Context and rationale	Information request or comment
ECCC-1	Wildlife	Section 6.1, Table 6.1, page 6.2	<p>ECCC does not support the conclusion that Upland Wildlife and Migratory Birds have limited potential for interaction with the Project. ECCC considers muskeg-type wetland and old forest habitats to provide suitable habitat to a variety of upland wildlife and migratory birds, including species at risk.</p> <p>ECCC does not consider the assessment of wildlife, including migratory birds and species at risk, to be adequately addressed under the Wetland VC. The structure of this section leads to inconsistencies in the ranking of project interactions and ultimately to an inadequate assessment of potential effects to wildlife. For example, in Table 14.2, the proponent ranks pile driving, area lighting and utilities as 0 (no measurable reaction). While this may prove true for the assessment of wetlands, ECCC does not support this conclusion for wildlife.</p>	<p>ECCC recommends that the Wetland VC be restricted to an assessment of vegetation communities and wetland function and recommends inclusion of, at a minimum, separate terrestrial wildlife and wildlife resources, migratory birds, and species at risk (including vertebrates, invertebrates, plants, and lichens) Valued Components (VCs). Please provide updated assessment chapters for each new VC with appropriately selected representative species (see comment #3 and #9).</p>
ECCC-2	Wildlife	Section 6.2.1, page 6.4; and Figure 6.1, page 6.2	<p>The LEA selected for the assessment of the Wetland VC is considered too small to assess potential direct and indirect effects of the Project.</p> <p>The Wetlands VC should incorporate the project footprint / berth areas and any access routes required in order to assess all direct and indirect potential effects to wildlife, species at risk, and migratory birds. It is important to adopt a</p>	<p>ECCC recommends the Proponent provide an updated EEE with a broader LEA for the assessment of the Wetlands VC that incorporates the project footprint / berth areas and any access routes on federal lands.</p>



ECCC-3	Wildlife	Section 10.1.2, page 10.2	wetland LEA capable of assessing potential effects to the entire Ridley Island wetland complex.  The assessment of marine birds does not include selection of indicator/representative species.	<p>ECCC recommends the Proponent provide an updated EEE with representative species similar to the structure presented in Section 8.1.2 and Table 8.2. ECCC stresses that selection of marine bird indicators should be representative of groups with the potential to be affected by both construction of the berth and shipping activities, including accidents and malfunctions (e.g., pelagic species, shorebirds, waterfowl)</p> <p>ECCC recommends the Proponent provide further justification for not completing site specific marine bird surveys, taking into consideration: the gap between the most recent marine bird surveys and present; habitat modifications that have occurred since these surveys; their potential for these habitat modifications to result in changes to marine bird habitat use; and the ability to adequately assess cumulative effects.</p> <p>The following information is needed to identify the extent to which further site-specific surveys are warranted:</p> <ul style="list-style-type: none"><li>• Outline the geographic area of coverage, protocols, and methodologies from previously conducted surveys being used in the desktop review.</li><li>• Identify and address remaining information gaps.</li><li>• Indicate which marine bird data (i.e. from which studies and EA reports) were used in the desktop review.</li></ul>
ECCC-4	Wildlife	Section 10.3, page 10.5	The EEE indicates that a variety of existing data and environmental assessment (EA) reports that include studies of marine birds have been conducted in recent years for Project developments similar to RTI, and therefore the Proponent has relied upon a desktop review for background information on existing conditions in the Project area. Without additional justification and information that speaks to the relevance of existing data and previous EA reports to the currently proposed Project, ECCC is not able to determine if a desktop study is sufficient for assessing potential Project related effects to marine birds.	



ECCC-5	Wildlife	Section 10.3, page 10.5; 10.4, page 10.7; 14.3, page 14.2; and 14.4, page 14.10  Conceptual Wetland Compensation Plan	<p>The EEE description of baseline conditions and effects evaluation relies heavily on field studies, mapping, and imagery from the Canpotex environmental assessment application, and other industry reports. ECCC does not consider this adequate to describe existing conditions or assess potential effects as it does not capture the habitat disturbance <i>as a result</i> of the construction of the Ridley Island Road, Rail and Utility Corridor and is not considered to incorporate all available baseline data in the region.</p>	<ul style="list-style-type: none"><li>Consider additional existing project information beyond Ridley Island where survey information overlaps with the project area (e.g., Aurora LNG, Prince Rupert Gas Transmission).</li></ul> <p>ECCC recommends the Proponent provide an updated description of existing conditions and effects evaluation for both marine birds and wetlands in order to inform and properly assess potential effects to wildlife, including migratory birds and species at risk. The description of existing conditions should include habitat mapping using current aerial maps, which show the extent of the Ridley Island Road, Rail and Utility Corridor. A up-to-date literature review should also be completed to provide current science-based context for the assessment that goes beyond the literature reviews conducted for previous environmental assessments in the region. For example, multiple studies on the effects of artificial lighting on marine and migratory birds have recently been published, which can inform both the assessment of potential effects, as well as development of mitigation and monitoring plans.</p> <p>ECCC recommends the proponent reach out to applicable government, naturalist, or citizen science database coordinators, as well as ECCC, to get the most up-to-date data available within or near the project area. Industry reports should also include those nearby to Ridley Island, such as Aurora LNG, Pacific Northwest LNG, Prince Rupert Gas Transmission, etc. This will provide regional context for the assessment.</p>
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ECCC-6	Wildlife	Section 10.4.1, page 10.7	ECCC does not support the rankings and conclusions drawn for potential effects to marine birds. The discussion/rationale for the conclusions of the assessment of each project activity must be based on available scientific literature in order for ECCC to be able to determine the technical merit of the proponent's conclusions, particularly where interactions are ranked as 0 or 1 and not carried through for assessment/mitigation. For example, the proponent asserts that onshore dredgate will have a nominal interaction with marine birds and is not expected to result in an effect of concern if no mitigation is applied (Rank 1), but does not provide any evidence to support their conclusions, in particular for concerns related to the potential for wetland contamination.	<p>The proponent should also note that the proposed project is located near to Big Bay to Delusion Bay Important Bird and Biodiversity Area (IBA), an area recognized as important (global/continental) to staging waterbirds.</p> <p>ECCC recommends the Proponent provide additional, science-based rationale for the ranking and potential exclusion of each project interaction.</p>
ECCC-7	Wildlife	Section 10.4.5, page 10.14	Attraction to lights at night or in poor visibility conditions during the day may result in collision with lit structures or their support structures, or with other migratory birds. Disoriented migratory birds are prone to circling light sources and may deplete their energy reserves and either die of exhaustion or be forced to land where they are at risk of predation.	<p>The following beneficial management practices can help minimize the risk of migratory bird mortality due to artificial light, and should be considered in the EEE (please note that navigational lighting has not been considered here):</p> <ul style="list-style-type: none"><li>• The minimum amount of aircraft warning and obstruction avoidance lighting should be used on tall structures. Warning lights should flash, and should completely turn off between flashes.</li><li>• The fewest number of site-illuminating lights possible should be used in the project area (while</li></ul>



		<p>for migratory birds. The following recommendations are provided with the intention of helping identify the appropriate elements that should be considered in the development of mitigation measures or beneficial management practices for migratory birds. For more information, please see: <a href="https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/overview.html">https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/overview.html</a>.</p>	<p>still conforming to Occupational Health and Safety standards).</p> <ul style="list-style-type: none"><li>• Only strobe lights should be used at night (excluding general site illumination), at the lowest intensity and fewest number of flashes per minute allowable by Transport Canada.</li><li>• Lighting for the safety of the employees should be shielded to shine down and used only where it is needed.</li><li>• LED lights should be used instead of incandescent lights, where possible. LED light fixtures are less prone to light trespass (i.e. are better at directing light where it needs to be, and do not bleed light into the surrounding area). This property reduces the incidence of migratory bird attraction.</li><li>• The use of lights should be reduced during inclement/foggy weather, where possible.</li></ul> <p>To assess the impacts of light attraction on marine and migratory birds, ECCC encourages the Proponent to design a follow-up monitoring program to document any strandings or mortality, identify high risk periods and/or structures, and inform requirements for adaptive management. The monitoring program should be designed using the results and/or mitigation procedures generated by ongoing research in Canada and elsewhere in the world.</p> <p>ECCC advises the following recommended beneficial management practices for working on shorelines:</p> <ul style="list-style-type: none"><li>• Staff, contractors and visitors should not approach concentrations of seabirds, sea ducks or shorebirds.</li></ul>
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ECCC-8	Wildlife	Section 14.0, page 14.1	<p>The most recent data and mapping referenced for the wetland functions assessment was completed in 2011. Up-to-date baseline studies, specific to environmental concerns for this project, should be conducted to properly assess potential effects to wetlands. Aerial imagery is</p>	<ul style="list-style-type: none"><li>• All vessels should use the main navigation channels to get to and from the site, and should have well muffled machinery.</li><li>• Staff and contractors should undertake any measures that may minimize or eliminate discharge of oily waste into the marine environment.</li><li>• Food scraps and other garbage left on beaches and other coastal habitats can artificially enhance the populations of avian and mammalian predators of eggs and chicks. The proponent should ensure that no litter (including food waste) is left in coastal areas by their staff and/or contractors.</li><li>• If there is any noticeable change in seabird numbers or distribution at the location during operations, ECCC should be notified.</li></ul> <p>Further, ECCC recommends that the proponent identify measures to prevent and mitigate the risk of engaging in destructive or disruptive activities, in key sensitive periods (e.g. migration and nesting) and locations, to migratory birds, their nests and eggs. Avoidance guidelines available on ECCC website should be given appropriate consideration: <a href="http://ec.gc.ca/paom-itmb/default.asp?lang=En&amp;n=C51C415F-1">http://ec.gc.ca/paom-itmb/default.asp?lang=En&amp;n=C51C415F-1</a>.</p> <p>ECCC recommends the Proponent provide updated wetland habitat mapping with recent ground-truthing, as this information is required to properly assess effects to wetland habitats, and will also be important to the assessment of cumulative effects.</p>
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ECCC-9	Wildlife	Section 14.1.2, page 14.1; and 14.3.2.4, page 14.8	similarly out of date, and does not include recent development of the Canpotex road and rail loop.	<p>ECCC also recommends the Proponent consider conducting hydrological modelling and sediment toxicity studies to assist in the review of effects to wetland habitats.</p> <p>ECCC recommends the Proponent provide an updated EEE with representative species similar to the structure presented in Section 8.1.2 and Table 8.2. Selection of wildlife indicators should be representative of all groups (e.g., migratory birds, bats, amphibians) with the potential to be affected by both sensory disturbance due to the berth construction, subtidal blasting, pile driving, and other high disturbance project activities, as well as the proposed on land disposal and associated contamination concerns. At a minimum, ECCC recommends inclusion of marbled murrelet (due to its conservation status and the project's proximity to critical habitat), little brown myotis (due to its conservation status and confirmed presence within the evaluation area), and habitat community models (old forest and wetland songbird communities) to assess effects to species at risk and migratory birds.</p> <p>Refer to comment #1 regarding the assessment of wildlife under the wetland VC.</p> <p>ECCC recommends a complete assessment of all species listed under Schedule 1 of the <i>Species at Risk Act</i>, including those listed as Special Concern.</p>
ECCC-10	Wildlife	Section 14.3.2, Table 14.1, page 14.8	The assessment of species at risk should include all species listed under Schedule 1 of the <i>Species at Risk Act</i> with potential to be affected by the proposed berth expansion, shipping, or disposal on land. This should include species listed as Special Concern, similar to the assessment completed for Marine Birds (Section 10 of the EEE). This will also provide additional context for	

ECCC-11	Wildlife	<p>Section 14.3.2, page 14.4; 14.4.1, page 14.10; and 14.4.3, page 14.14</p> <p>CWCP</p>	<p>bird species at risk that are also protected under the <i>Migratory Birds Convention Act</i>.</p> <p>The EEE states that the hydrological functions of Ridley Island wetlands have been evaluated through desktop studies, but it is unclear what hydrology studies were incorporated into the desktop assessment. There has been no baseline studies or modeling done on the potential changes in hydrological function and resultant effects on wildlife and vegetation.</p> <p>The EEE also states that the project will alter soil stratigraphy and affect the groundwater quality below the site. No studies or modelling have been done to further assess the potential effects on wetlands and wildlife, including migratory birds and species at risk, through these changes.</p> <p>The EEE further states that the geographic extent of residual effects will be confined to the site study area, but no hydrological or groundwater modelling has been conducted to support these statements. Also, it appears as though consideration has not been given to a regional study area or the potential long-term effects on the wetland functions and wildlife of Ridley Island.</p>	<p>ECCC recommends the Proponent incorporate the most recent methods and wetland function assessment information available, including but not limited to:</p> <p><u>Hanson, et al. (2008) Wetland Ecological Functions Assessment: An Overview of Approaches. Canadian Wildlife Service Technical Report Series No. 497.</u></p>
ECCC-12	Wildlife	<p>Section 14.4.2, Table 14.3, page 14.12</p>	<p>ECCC does not consider the sensitive timing window identified in Table 14.3 between April 1 – July 31 adequate to protect birds and bats.</p> <p>In addition, ECCC does not consider avoidance of the breeding window adequate to mitigate</p>	<p>ECCC recommends the Proponent update the sensitive timing windows to reflect current provincial and federal best management practices:</p> <ul style="list-style-type: none"> <li>ECCC’s general nesting period guidelines (approximately April 1 to August 18) available at: <a href="https://www.canada.ca/en/environment-climate-">https://www.canada.ca/en/environment-climate-</a></li> </ul>



			potential effects to western toad or bats. Consideration for overwintering should also be incorporated into the assessment and design of mitigation and monitoring plans.	<a href="#">change/services/avoiding-harm-migratory-birds-general-nesting-periods/nesting-periods.html#_zoneA_calendar</a> . <ul style="list-style-type: none"><li>Critical timing windows for bat maternity (May 15<sup>th</sup> to Sept. 30<sup>th</sup>) and hibernaculum sites (Oct. 1<sup>st</sup> to May 31<sup>st</sup>) as outlined in the BC Ministry of Forests, Lands, and Natural Resource Operations' <i>Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia (2014)</i>.</li></ul>
ECCC-13	Wildlife	Section 14.4.2, Table 14.3, page 14.12	The proponent has not adequately assessed potential effects to wetland habitat due to proposed on land sediment disposal and associated water discharge, including potential for contamination of wetland habitat. In particular, ECCC does not consider the assessment adequate to determine potential for effects to migratory birds as it relates to Section 5.1 (1) of the <i>Migratory Birds Convention Act</i> .	<p>ECCC recommends the Proponent provide additional information regarding potential effects to wetland habitat, as well as direct and indirect effects to wildlife, including migratory birds and species at risk as a result of the proposed on land disposal of contaminated sediments.</p> <p>The assessment should also include a current, science-based assessment of migratory bird use of the proposed on land disposal footprint and adjacent area in order to inform potential for harm due to contaminated sediments. ECCC recommends the assessment of migratory birds follow the guidance suggested below:</p> <ul style="list-style-type: none"><li>Hanson, A., I. Goudie, A. Lang, C. Gjerdrum, R. Cotter, and G. Donaldson. 2009. <a href="#">A Framework for the Scientific Assessment of Potential Project Impacts on Birds</a>. Canadian Wildlife Service Technical Report Series No. 508. Atlantic Region. 61 pp</li></ul>
ECCC-14	Wildlife	Section 14.4.4, page 14.14		ECCC recommends the Proponent provide further detail on which follow-up programs and development

ECCC-15	Wildlife	Section 14.4.4, Table 14.4, page 14.15  CWCP	<p>ECCC noted inconsistencies between the EEE and CWCP. The EEE indicates that “no follow-up strategy is anticipated for the wetlands VC”, while the CWCP indicates there will be a follow-up monitoring program. Further, the residual effects assessment is lacking in current, project-specific field studies and modelling necessary to determine significance of project residual effects.</p>	<p>projects were reviewed during the design of project-specific mitigation measures.</p> <p>Additionally, ECCC suggests that the Proponent may wish to consider/incorporate the following guidelines and best management practices; including, but are not limited to:</p> <ul style="list-style-type: none"> <li>• Wetland Stewardship Partnership 2009 Wetland Ways: Interim Guidance for Wetland Protection and Conservation in British Columbia</li> <li>• MOE Develop with Care 2014</li> <li>• FLNRO 2014 Compendium of Wildlife Guidelines for Industrial Development Projects in the North Area, British Columbia</li> <li>• FLNRO 2016 Best Management Practices for Amphibian and Reptile Salvages in British Columbia</li> </ul> <p>ECCC recommends that the Proponent confirm whether a wetland monitoring program will be developed prior to the construction phase. ECCC suggests that inconsistencies between the EEE and CWCP be reconciled to guide the assessment of wetland functions to be quantitative, based on standardized wildlife survey protocols. Quantitative abundance data of wetland function will help to inform:</p> <ul style="list-style-type: none"> <li>• Avoidance and mitigation measures</li> <li>• Compensation measures</li> <li>• Follow-up monitoring, including mitigation and compensation success and accuracy of EEE predictions</li> </ul>
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ECCC-16	Wildlife	Section 15.0, Table 15.1, page 15.2	<p>ECCC does not consider the currently proposed environmental management plans adequate to protect and monitor potential effects to wildlife, including migratory birds and species at risk. Wildlife follow-up programs should be implemented to verify the accuracy of the effects evaluation and determine the effectiveness of mitigation measures in order to inform any potential requirements for adaptive management.</p>	<p>ECCC recommends the following additional follow-up programs be designed and implemented:</p> <ul style="list-style-type: none"> <li>• Marine Bird Light Monitoring and Mitigation Plan, as discussed in comment #7.</li> <li>• Amphibian Salvage, Monitoring, and Mitigation Plan. This plan should consider protection of amphibians during all phases of the project and salvage methods should be based on the provincial 2016 <i>Best Management Practices for Amphibian and Reptile Salvages in British Columbia</i>, including post-salvage monitoring to inform adaptive management (e.g., issues with road mortality during western toad dispersal periods).</li> </ul>
ECCC-17	Wildlife	Section 15.0, Table 15.1, page 15.2	<p>From the description provided in Section 15.0, it is unclear to ECCC how wildlife, including migratory birds and species at risk, will be incorporated into the proposed environmental management plans.</p>	<p>ECCC recommends the inclusion of the following information related to the proposed environmental management plans:</p> <ul style="list-style-type: none"> <li>• Confirm that specific consideration for the protection of marine birds will be included within the proposed <i>Underwater Noise Management Plan</i>, <i>Dredging Management Plan</i>, and <i>Pile Driving Plan</i>.</li> <li>• Consideration for the protection of terrestrial wildlife, including migratory birds and species at risk, under the <i>Pile Driving Plan</i> due to the potential for sensory disturbance and indirect incidental take.</li> <li>• Additional detail on the Sensitive Habitat Features and Species at Risk Environmental Management Plan. ECCC stresses the importance of addressing concerns related to wetland and old forest, as well as bird, bat, and amphibian species at risk.</li> </ul>

ECCC-18	Wildlife	Section 17.0, page 17.1	<p>ECCC does not consider the EEE to adequately address past and present projects within the existing conditions section. In particular, the construction of the Ridley Island Road, Rail and Utility Corridor has resulted in an increase of anthropogenic disturbance that is not considered within the EEE. Figures, mapping, and field studies from the 2011 Canpotex Environmental Assessment are no longer representative of current conditions on Ridley Island. Cumulative effects to migratory birds and species at risk, including western toad and marbled murrelet, are of particular concern to ECCC.</p>	<p>Table 15.1 indicates there will be “Environmental Monitoring Plans”, but does not specify for what; as such, ECCC requests additional information on all proposed Environmental Monitoring Plans.</p> <p>ECCC recommends a cumulative effects assessment of past and present projects for wildlife, migratory birds, and species at risk (including those listed as Special Concern) be completed. The cumulative effects assessment should be based on current (2019) conditions of remaining old forest and wetland habitat on Ridley Island, as it relates to proposed habitat loss and potential contamination from disposal of sediments.</p>
ECCC-19	Wildlife	Section 17.2, Table 17.2, page 17.3	<p>Based on the lists provided in this section, note that the following projects (not necessarily a complete list) are also located in the Prince Rupert area and should be included in the cumulative assessment of reasonably foreseeable projects:</p> <ul style="list-style-type: none"> <li>• Pacific Northern Gas Looping</li> <li>• Prince Rupert Gas Transmission</li> </ul>	<p>ECCC recommends that the Proponent update the cumulative effects assessment to include all reasonably foreseeable projects.</p>
ECCC-20	Wildlife	Section 18.2, page 18.2	<p>The project description indicates that after the berth expansion is constructed, the new berth, which currently handles dry-bulk commodities (coal), would be designed to accommodate the export of propane.</p>	<p>The following information should be included in any Wildlife Emergency Response Plan for pollution and non-pollution (i.e., lighting) events associated with the Project:</p> <ul style="list-style-type: none"> <li>• Information (such as population, life cycle and habitat requirements) on the migratory birds and/or species at risk in the project area,</li> </ul>



		<p>The proponent further indicates that “the report identified potential marine accidents and malfunctions, and proposed management plans and mitigation measures to avoid these events and, in their unlikely occurrence, to mitigate effects to VCs. Because accidents and malfunctions are unplanned or unexpected events that are unlikely to occur, associated environmental effects from the accident and malfunction events were assessed as unlikely to occur and no significant residual effects to the environment or human health were identified”.</p> <p>Depending on the specific timing, location and other conditions related to the spill, it is ECCC’s view that a large-scale spill resulting from the Project has the potential to result in sizable effects to marine birds.</p> <p>To assist the proponent in developing mitigation in relation to pollution and non-pollution events, CWS offers the following considerations.</p>	<p>including areas that could be potentially impacted by an oil spill;</p> <ul style="list-style-type: none"><li>• Information concerning the most appropriate strategy for assessing the extent of risk or impact to migratory birds, species at risk, and their habitats;</li><li>• Information concerning the most appropriate (regionally- and temporally- specific) response strategies for preventing more migratory birds, species at risk, and their habitats from becoming affected;</li><li>• Information concerning the appropriate response strategies for the treatment of affected migratory birds, species at risk, and their habitats; and,</li><li>• The type and extent of monitoring that would be conducted in relation to various events (e.g., spill event from pipeline, terminal, marine), including information that would be collected prior to, during, and following an event such as an oil spill.</li></ul> <p>Some key ECCC documents that may be useful resources during the development of a monitoring system include:</p> <ul style="list-style-type: none"><li>• Environment and Climate Change Canada Canadian Wildlife Service National Policy on Wildlife Emergency Response.</li><li>• Environment and Climate Change Canada Canadian Wildlife Service Technical Guidance and Protocols for Migratory Bird Surveys for Emergency Response in Canada.</li><li>• Environment and Climate Change Canada Canadian Wildlife Service Guide to Cost Recovery for Wildlife and Natural Resource Response</li></ul>
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ECCC-21	Wildlife	CWCP Section 3.3.1, page 4	<p>ECCC notes that development of the CWCP is at a preliminary stage; as such, ECCC is unable to comment on the technical merit or effectiveness of the plan at this time.</p> <p>ECCC also notes that habitat mapping prepared for the Canpotex assessment is no longer accurate. Without up-to-date mapping,</p>	<p>Activities During and After Pollution Incidents in the Marine System in Canada.</p> <ul style="list-style-type: none"><li>• Environment and Climate Change Canada Canadian Wildlife Service Guidelines for Establishing and Operating Treatment Facilities for Wildlife.</li><li>• Environment and Climate Change Canada Canadian Wildlife Service Guidelines for the Capture, Transport, Cleaning, and Rehabilitation of Oiled Wildlife.</li><li>• Environment and Climate Change Canada Canadian Wildlife Service National (Regional and Area based) Wildlife Response Contingency Plans, where available.</li><li>• Environment and Climate Change Canada Canadian Wildlife Service Guidelines for Deterrence and Wildlife Dispersal Techniques Used During Pollution and Non-pollution Incidents in Canada.</li><li>• Environment and Climate Change Canada Procedures for handling and documenting stranded birds encountered on infrastructure offshore Atlantic Canada (this document is specific to Atlantic Canada, but many of the procedures are relevant on the Pacific coast).</li></ul> <p>ECCC recommends that the Proponent update the CWCP using updated habitat mapping to enable accurate determination of requirements for wetland habitat compensation.</p>
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			requirements for wetland compensation cannot be determined.	
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## Annex 2: ECCC's Comments Related to Potential Permits under the *Species at Risk Act*

#	Topic	EEE section	Context and rationale	Information request or comment
ECCC-22	Wildlife	Section 14.2.4, page 14.2	<p>The EEE indicates that adequate information on wetland habitat is available from the assessments of similar projects and therefore the Proponent has relied upon a desktop review for background information on existing conditions in the Project area. Without additional justification and information that speaks to the relevance of existing data and previous EA reports to the currently proposed Project, ECCC does not consider this desktop review adequate to assess effects to wildlife; as such, ECCC is not able to determine if a desktop study is sufficient for assessing potential Project related effects to wildlife or wetlands at this time.</p>	<p>ECCC requests the proponent provide additional information on baseline studies consulted during the desktop review, as outlined in comment #4 and 5. The proponent should also consider the following baseline surveys to support the assessment of wildlife, including migratory birds and species at risk:</p> <ul style="list-style-type: none"><li>• Swallows and swifts surveys, targeting barn swallow, bank swallow and black swift.</li><li>• Marbled murrelet audio-visual surveys and habitat suitability mapping, as suitable nesting habitat is located on Ridley Island, including in and around the Project area and mapped critical habitat on the southeast shoreline; however, up-to-date mapping is absent.</li><li>• Western Screech Owl roost assessment, to assist in determining whether a permit under s.73 of the <i>Species at Risk Act</i> may be required.</li><li>• Marsh birds surveys (sora, Virginia rail, etc.) in support of the wetland functions assessment.</li><li>• Pond-dwelling amphibian surveys target western toad breeding habitat to inform development of a salvage and monitoring program.</li><li>• Acoustic monitoring for bat species at risk to inform requirements for habitat mapping and telemetry in support of potential requirements for permitting under s.73 of the <i>Species at Risk Act</i>.</li><li>• Rare plant surveys, including both vascular and non-vascular plants and lichens, targeting federally listed species.</li></ul>

				<p>ECCC requests the Proponent consider the use of acoustic recording units, deployed in multiple habitat types, seasons, and time periods. Passive acoustic technology enables collection of a larger baseline dataset; avoids concerns regarding predation and harassment through use of call playback; and can target a broader range of species, including cryptic species, with potential to occur in the area (e.g., nocturnal and diurnal raptors, migratory birds, marsh birds, CONI).</p>
ECCC-23	Wildlife	14.3.2, Table 14.1, page 14.8	<p>Canpotex habitat suitability modelling identified areas of moderate habitat suitability for both northern goshawk and marbled murrelet; and the project is in close proximity to marbled murrelet critical habitat (southeast end of Ridley Island).</p>	<p>As the proponent has not conducted any wildlife baseline studies and the EEE draws heavily on the Canpotex Environmental Assessment, provide a rationale, based on scientific evidence, to support the conclusion that there is no suitable nesting habitat with potential to be affected by the proposed project activities.</p>
ECCC-24	Wildlife	14.4.2, Table 14.3, page 14.12	<p>Table 14.3 indicates that nest and roost surveys are proposed as mitigation prior to vegetation clearing during the breeding season. ECCC does not consider bird nest surveys adequate to avoid incidental take of migratory birds during the breeding season; similarly, identification of bat hibernacula and maternity roosts can be challenging on the north coast.</p>	<p>Given the difficulty in identifying maternity roosts and hibernacula in coastal, forested habitats:</p> <ul style="list-style-type: none"> <li>- Provide detailed information on methods for bat roost and hibernaculum surveys proposed prior to clearing during the breeding season.</li> <li>- Consider whether telemetry and/or other types of data are needed to assess presence of any roosting or hibernating bats in the area. If telemetry data is not collected, then provide a rationale for how potential impacts to bats and their residences, to which the SARA prohibitions apply on federal lands, will be appropriately managed. Acoustic bat data should be collected for a minimum period of 1 year to identify seasonal differences in</li> </ul>



ECCC-25	Wildlife	14.4.3, page 14.14	<p>ECCC has the following comments on the assessment of residual effects to wetland habitat:</p> <ul style="list-style-type: none"><li>• The proponent has not provided adequate information regarding sediment contamination for ECCC to be able to determine significance of the potential effects to wildlife in the context of magnitude and geographic extent.</li><li>• The proponent has indicated that no alternatives for the proposed on land disposal site were assessed.</li><li>• Overall, ECCC does not find that the conclusion of no significant residual effects is supported by this EEE. Due to the amount of time since the Canpotex environmental assessment was conducted, the habitat</li></ul>	<p>activity and inform the development of mitigation and management plans.</p> <p>To avoid incidental take to migratory birds, which is prohibited under the <i>Migratory Birds Convention Act</i>, ECCC recommends all vegetation clearing be conducted outside ECCC's general nesting period for birds (April 1 to August 18. See the following link for further information: <a href="https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods.html">https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods.html</a>). Consideration of the effects of high disturbance activities in proximity to potential nesting habitat is also recommended.</p> <p>Conduct an assessment of alternative disposal locations. ECCC requests this assessment be conducted to avoid effects to old growth forest and sensitive wetland habitats that support migratory birds protected under the <i>Migratory Birds Convention Act</i> and species at risk protected under the <i>Species at Risk Act</i> (SARA). This information would also be required to support any potential permits under the SARA.</p>
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			disturbances due to the construction of the road and rail loop for that project, and the sensitivity of wetland habitats, ECCC does not consider a desktop assessment appropriate to assess effects, including cumulative effects, to both wetlands and old growth forest adequate. In addition, the ECCC does not adequately address the potential for contamination of wetland habitat due to the proposed on land disposal.	
ECCC-26	Wildlife	CWCP Section 5.1, page 9	The wetland compensation options described in Section 5.1 do not describe enhancements specific to species at risk described in the ECC.	ECCC requests additional information on proposed enhancement options for all Species at Risk listed under Schedule 1 of the <i>Species at Risk Act</i> described in the ECC.

**Nutton, Byron**

---

**From:** Norma Powell <npowell@hemmera.com>  
**Sent:** 2019–March-14 4:20 PM  
**To:** Groenewoud, Taylor (EC); Bryant-Gravelle, Michelle  
**Cc:** Inouye, Kevin; Jack Smith; Nutton, Byron; Hodaly, Al (EC); Marshall, Kathryn (EC); Script Runner  
**Subject:** {2200-001.01}14Mar\_eml\_hemmera\_rti\_to\_ECCC\_second batch of comments on draft EEE

Thanks Taylor.

As per the request of the Committee members they wanted the FA comments circulated once the responses had been prepared.

Norma

**Norma Powell, R.P.Bio., ENV SP**  
**Hemmera, an Ausenco Company**

T: 604.669.0424 ext. [REDACTED] C: [REDACTED]

**From:** Groenewoud, Taylor (EC) <taylor.groenewoud@canada.ca>  
**Sent:** March 14, 2019 4:12 PM  
**To:** Bryant-Gravelle, Michelle <mbryant@rti.ca>  
**Cc:** Inouye, Kevin <kevin.inouye@tc.gc.ca>; Jack Smith <jsmith@rupertport.com>; byron.nutton@dfo-mpo.gc.ca; Norma Powell <npowell@hemmera.com>; Hodaly, Al (EC) <al.hodaly@canada.ca>; Marshall, Kathryn (EC) <kathryn.marshall@canada.ca>  
**Subject:** RTI: ECCC second batch of comments on draft EEE

Hi Michelle,

Please find attached the second batch of ECCC's comments on version 3 of the draft EEE for the RTI berth expansion project (related to wildlife). As noted in the attached covering letter, at this time ECCC will not be making a determination on significance of adverse environmental effects; however, ECCC would require satisfactory responses to these comments if our role as a federal authority is confirmed. I have copied all other federal authorities for their consideration of ECCC's comments. Please copy me when these comments are circulated to the technical committee.

Cheers,  
 Taylor

**Taylor Groenewoud MRM (Planning)**

Environmental Assessment Coordinator, P&Y Environmental Protections and Operations  
 Environment and Climate Change Canada | Government of Canada  
[taylor.groenewoud@canada.ca](mailto:taylor.groenewoud@canada.ca) | Tel: 604-666-8342

Coordonnatrice de l'évaluation environnementale, Activités de protection de l'environnement P&Y  
 Environnement et changement climatique Canada | Gouvernement du Canada  
[taylor.groenewoud@canada.ca](mailto:taylor.groenewoud@canada.ca) | Tél: 604-666-8342

*I acknowledge that I work, live and play on the unceded and traditional territories of the Musqueam, Squamish and Tsleil Wautuh First Nations.*

Confidentiality Notice

**Pages 1077 to / à 1124  
are withheld pursuant to section  
sont retenues en vertu de l'article**

**21(1)(b)**

**of the Access to Information Act  
de la Loi sur l'accès à l'information**



**Nutton, Byron**

---

**From:** Lyen, Ron  
**Sent:** 2019–March-14 5:33 PM  
**To:** Hardacre, Kim; Goodwin-Ruch, Steven  
**Cc:** True, Eric; Runciman, Bruce; Nutton, Byron  
**Subject:** Re: 18-HSP-8315 Nechako White Sturgeon Recovery Initiative: Amendment Request

Hi Kim

Thanks for the update. I'll chat with Steve tomorrow and get back to you ASAP.

Regards

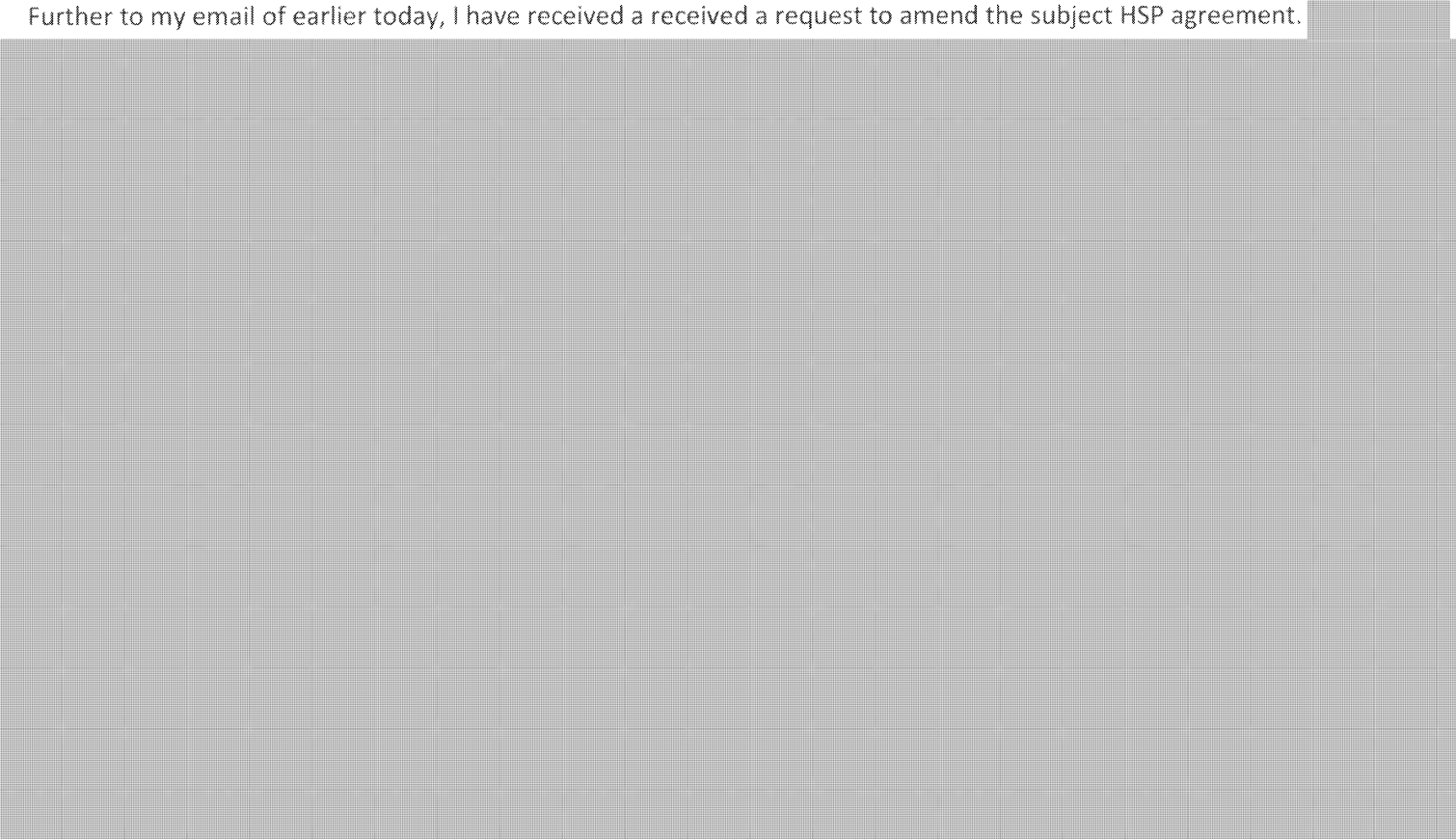
Ron Lyen

Sent from my BlackBerry 10 smartphone on the Bell network.

**From:** Hardacre, Kim  
**Sent:** Thursday, March 14, 2019 8:31 PM  
**To:** Lyen, Ron; Goodwin-Ruch, Steven  
**Cc:** True, Eric; Runciman, Bruce; Nutton, Byron  
**Subject:** 18-HSP-8315 Nechako White Sturgeon Recovery Initiative: Amendment Request

Hello Ron and Steven,

Further to my email of earlier today, I have received a request to amend the subject HSP agreement.



Best regards,  
Kim Hardacre

A/Partnerships Coordinator / Coordonnateur des partenariats  
Fisheries Protection Program / Programme de protection des pêches  
Ecosystem Management Branch / Direction de la gestion des écosystèmes  
Fisheries and Oceans Canada, Pacific Region / Pêches et Océans Canada, Région du Pacifique  
Government of Canada / Gouvernement du Canada  
200-401 Burrard Street, Vancouver BC V6C 3S4 / 401 Burrard Street, bureau 200, Vancouver C.-B. V6C 3S4  
E-mail [Kim.Hardacre@dfo-mpo.gc.ca](mailto:Kim.Hardacre@dfo-mpo.gc.ca) / Tel: (604) 666-0130 / Cell: (604) 347-8907

**From:** NWSRI Coordinator <[info@nechakowhitesturgeon.org](mailto:info@nechakowhitesturgeon.org)>

**Sent:** 2019-March-14 11:56 AM

**To:** Hardacre, Kim <[Kim.Hardacre@dfo-mpo.gc.ca](mailto:Kim.Hardacre@dfo-mpo.gc.ca)>

**Cc:** [REDACTED]

**Subject:** HSP 8315

Hello Kim,

As per our conversation today, please find attached a letter outlining our request regarding the remaining funds for the HSP 8315 project.

Please let me know if you need anything further to somehow maybe release some of the funds to help pay for the PIT tag readers for the Boat Kit Program.

Sincerely,

Michelle

--

Michelle Roberge  
NWSRI Coordinator

C [REDACTED]

E: [info@nechakowhitesturgeon.org](mailto:info@nechakowhitesturgeon.org)

W: [www.nechakowhitesturgeon.org](http://www.nechakowhitesturgeon.org)

PO Box 710, Vanderhoof, BC, V0J 3A0

**Pages 1127 to / à 1128  
are duplicates of  
sont des duplicatas des  
pages 1033 to / à 1034**

**Pages 1129 to / à 1155  
are withheld pursuant to section  
sont retenues en vertu de l'article**

**21(1)(b)**

**of the Access to Information Act  
de la Loi sur l'accès à l'information**

## Nutton, Byron

---

**Subject:** standing check in meeting  
**Location:** Jason to call Byron on landline 250 756 7298

**Start:** Fri 2019-03-15 2:00 PM  
**End:** Fri 2019-03-15 2:30 PM  
**Show Time As:** Tentative

**Recurrence:** Weekly  
**Recurrence Pattern:** every Friday from 9:00 AM to 9:30 AM

**Meeting Status:** Not yet responded

**Organizer:** Hwang, Jason  
**Required Attendees:** Nutton, Byron

## Nutton, Byron

---

**From:** Lyen, Ron  
**Sent:** 2019-March-15 9:01 AM  
**To:** Hardacre, Kim; Goodwin-Ruch, Steven  
**Cc:** True, Eric; Runciman, Bruce; Nutton, Byron  
**Subject:** RE: 18-HSP-8315 Nechako White Sturgeon Recovery Initiative: Amendment Request

Hi Kim

As this is a change in activity it will require a formal amendment for signature.

Ron

**From:** Hardacre, Kim <Kim.Hardacre@dfo-mpo.gc.ca>  
**Sent:** March-15-19 12:00 PM  
**To:** Lyen, Ron <Ron.Lyen@dfo-mpo.gc.ca>; Goodwin-Ruch, Steven <Steven.Goodwin-Ruch@dfo-mpo.gc.ca>  
**Cc:** True, Eric <Eric.True@dfo-mpo.gc.ca>; Runciman, Bruce <Bruce.Runciman@dfo-mpo.gc.ca>; Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Subject:** Re: 18-HSP-8315 Nechako White Sturgeon Recovery Initiative: Amendment Request

Thank you for the quick reply Ron. As I'm new to the HSP group, would you please clarify whether this email chain is sufficient or if a formal amendment should be put forward for signature.

Regards,  
Kim Hardacre

Sent from my BlackBerry 10 smartphone on the Bell network.

**From:** Lyen, Ron  
**Sent:** Friday, March 15, 2019 7:50 AM  
**To:** Hardacre, Kim; Goodwin-Ruch, Steven  
**Cc:** True, Eric; Runciman, Bruce; Nutton, Byron  
**Subject:** RE: 18-HSP-8315 Nechako White Sturgeon Recovery Initiative: Amendment Request

Hi Kim

I've heard back from Sarah and Julie and they approve the amendment.

Ron

**From:** Hardacre, Kim <Kim.Hardacre@dfo-mpo.gc.ca>  
**Sent:** March-14-19 8:31 PM  
**To:** Lyen, Ron <Ron.Lyen@dfo-mpo.gc.ca>; Goodwin-Ruch, Steven <Steven.Goodwin-Ruch@dfo-mpo.gc.ca>  
**Cc:** True, Eric <Eric.True@dfo-mpo.gc.ca>; Runciman, Bruce <Bruce.Runciman@dfo-mpo.gc.ca>; Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Subject:** 18-HSP-8315 Nechako White Sturgeon Recovery Initiative: Amendment Request

Hello Ron and Steven,

Further to my email of earlier today, I have received a request to amend the subject HSP agreement.



Best regards,  
Kim Hardacre

A/Partnerships Coordinator / Coordonnateur des partenariats  
Fisheries Protection Program / Programme de protection des pêches  
Ecosystem Management Branch / Direction de la gestion des écosystèmes  
Fisheries and Oceans Canada, Pacific Region / Pêches et Océans Canada, Région du Pacifique  
Government of Canada / Gouvernement du Canada  
200-401 Burrard Street, Vancouver BC V6C 3S4 / 401 Burrard Street, bureau 200, Vancouver C.-B. V6C 3S4  
E-mail [Kim.Hardacre@dfo-mpo.gc.ca](mailto:Kim.Hardacre@dfo-mpo.gc.ca) / Tel: (604) 666-0130 / Cell: 

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**Sent:** 2019-March-14 11:56 AM

**To:** Hardacre, Kim <[Kim.Hardacre@dfo-mpo.gc.ca](mailto:Kim.Hardacre@dfo-mpo.gc.ca)>

**Cc:** 

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Sincerely,

Michelle

s.19(1)

--

Michelle Roberge  
*NWSRI Coordinator*

C: [REDACTED]  
E: [info@nechakowhitesturgeon.org](mailto:info@nechakowhitesturgeon.org)  
W: [www.nechakowhitesturgeon.org](http://www.nechakowhitesturgeon.org)  
PO Box 710, Vanderhoof, BC, V0J 3A0



## Nutton, Byron

---

**From:** Bryant-Gravelle, Michelle <mbryant@rti.ca>  
**Sent:** 2019-March-15 9:08 AM  
**To:** Groenewoud, Taylor (EC)  
**Cc:** Inouye, Kevin; Jack Smith; Nutton, Byron; Norma Powell; Hodaly, Al (EC); Marshall, Kathryn (EC)  
**Subject:** RE: RTI: ECCC second batch of comments on draft EEE

Hi Taylor,

Thank you, I will make sure Hemmera has received this batch of comments.

Regards,

s.19(1)



**MICHELLE BRYANT-GRAVELLE**

Corporate Affairs Manager

**RIDLEY TERMINALS INC.**

PO Bag 8000, Prince Rupert, BC Canada V8J 4H3  
Tel: 250.627.3585 Cell: [REDACTED] Fax: 250.624.2389  
[mbryant@rti.ca](mailto:mbryant@rti.ca) [www.rti.ca](http://www.rti.ca)

**From:** Groenewoud, Taylor (EC) <taylor.groenewoud@canada.ca>  
**Sent:** Thursday, March 14, 2019 4:12 PM  
**To:** Bryant-Gravelle, Michelle <mbryant@rti.ca>  
**Cc:** Inouye, Kevin <kevin.inouye@tc.gc.ca>; Jack Smith <jsmith@rupertport.com>; byron.nutton@dfo-mpo.gc.ca; Norma Powell <npowell@hemmera.com>; Hodaly, Al (EC) <al.hodaly@canada.ca>; Marshall, Kathryn (EC) <kathryn.marshall@canada.ca>  
**Subject:** RTI: ECCC second batch of comments on draft EEE

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Taylor

Taylor Groenewoud MRM (Planning)

Environmental Assessment Coordinator, P&Y Environmental Protections and Operations  
Environment and Climate Change Canada | Government of Canada  
taylor.groenewoud@canada.ca | Tel: 604-666-8342

Coordonnatrice de l'évaluation environnementale, Activités de protection de l'environnement P&Y  
Environnement et changement climatique Canada | Gouvernement du Canada  
taylor.groenewoud@canada.ca | Tél: 604-666-8342

*I acknowledge that I work, live and play on the unceded and traditional territories of the Musqueam, Squamish and Tsleil Wautuh First Nations.*

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## Nutton, Byron

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**From:** Cooper, Tola  
**Sent:** 2019–March-15 9:46 AM  
**To:** Nutton, Byron  
**Subject:** RE: March 14, 2019 management team meeting

Hey Byron,

Might be worth including a reminder on the Consultation tools too. That they are mandatory for all consultations and once complete need to be forwarded to Gabby, Shona or Teri for tracking.

Thanks!!

**From:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Sent:** Thursday, March 14, 2019 4:31 PM  
**To:** Engelsjord, Michael <Michael.Engelsjord@dfo-mpo.gc.ca>; Magnan, Alain <Alain.Magnan@dfo-mpo.gc.ca>; Rotinsky, Brenda <Brenda.Rotinsky@dfo-mpo.gc.ca>; Hwang, Jason <Jason.Hwang@dfo-mpo.gc.ca>; Cooper, Tola <Tola.Coopper@dfo-mpo.gc.ca>; Bonamis, Alston <Alston.Bonamis@dfo-mpo.gc.ca>; Naito, Brian <Brian.Naito@dfo-mpo.gc.ca>; Pulvermacher, Holly <Holly.Pulvermacher@dfo-mpo.gc.ca>; Benke, Anna <Anna.Benke@dfo-mpo.gc.ca>  
**Subject:** RE: March 14, 2019 management team meeting

In attendance:

Brenda (chair), Tola, Anna, Brian, Alston, Byron (notes)

Actions:

- previous action item re: LOC still outstanding – **Brenda and Al** to consider proposal
- year-end reminders re: PSPM and budgets – **All** to ensure their teams are on track
- Maplewood Flats – **Byron** to work on developing rationale, Brian offered to be sounding board
- State of the Salmon – **All** to consider nominating a third FPP staff to attend meeting in Nanaimo March 26/27
- Communications – **All** to ensure open lines of communication within their team re: staffing/transition

**From:** Engelsjord, Michael <Michael.Engelsjord@dfo-mpo.gc.ca>  
**Sent:** 2019–March-12 2:37 PM  
**To:** Magnan, Alain <Alain.Magnan@dfo-mpo.gc.ca>; Rotinsky, Brenda <Brenda.Rotinsky@dfo-mpo.gc.ca>; Hwang, Jason <Jason.Hwang@dfo-mpo.gc.ca>; Cooper, Tola <Tola.Coopper@dfo-mpo.gc.ca>; Bonamis, Alston <Alston.Bonamis@dfo-mpo.gc.ca>; Naito, Brian <Brian.Naito@dfo-mpo.gc.ca>; Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>; Pulvermacher, Holly <Holly.Pulvermacher@dfo-mpo.gc.ca>; Benke, Anna <Anna.Benke@dfo-mpo.gc.ca>  
**Subject:** March 14, 2019 management team meeting

I'm not available for the meeting this week. Do we want to proceed with meeting? If so, would someone record action items?

Michael Engelsjord

Team Leader, Fisheries Protection Program / Ecosystem Management Branch  
Fisheries and Oceans Canada / Government of Canada

Michael.Engelsjord@dfo-mpo.gc.ca / Tel. : 604-666-2365

Chef d'équipe, Programme de protection des pêches / Direction des écosystèmes  
Pêches et Océans Canada / Gouvernement du Canada  
Michael.Engelsjord@dfo-mpo.gc.ca / Tél. : 604-666-2365

**Nutton, Byron**

**From:** Norma Powell <npowell@hemmera.com>  
**Sent:** 2019–March-15 10:13 AM  
**To:** [REDACTED] Dennis Blake ; Elizabeth Harries ; [REDACTED]  
 Groenewoud, Taylor (EC); Hillary Hyland; Jack Smith ; [REDACTED]  
 [REDACTED] Katherine Marshall; Kevin Inouye ;  
 [REDACTED] Engelsjord, Michael; Michelle Bryant-Gravelle ; [REDACTED]  
 [REDACTED] Norma Powell; [REDACTED] Robert Bracken; [REDACTED] Scott  
 Lewis ; Tanya Martin; Seto, Vivian (Vancouver); [REDACTED]  
**Cc:** [REDACTED]  
**Subject:** {2200-001.01}15Mar\_eml\_hemmera\_rti\_to\_committee\_RESPONSES\_TO\_TC\_AND\_ECCC-1  
 \_FEB2019EEE\_#KITSUM 289; #METLA-PA-6550; DFO #18-HPAC-00245; TC #  
 2019-500061  
**Attachments:** log\_eee\_Mar14\_ECCC\_TC\_14032019.pdf

Dear Technical Committee Members,

Please find attached the Comment and Responses to Transport Canada and Environment and Climate Change Canada's review of the EEE dated February 2019.

Environment and Climate Change Canada have submitted a second set of comments to which responses will be developed.

Regards,  
 Norma

Norma Powell, R.P.Bio., ENV SP  
 Senior Project Manager



**Hemmera, an Ausenco Company**  
 18th Floor, 4730 Kingsway | Burnaby, BC | V5H 0C6  
 T: 604.669.0424 ext [REDACTED] F: 604.669.0430 | C: [REDACTED]  
[npowell@hemmera.com](mailto:npowell@hemmera.com) | [hemmera.com](http://hemmera.com) | [unsubscribe](#)

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Comment Code	Organization	Comment	Response
ECC- 2 -1	Environment and Climate Change Canada	<p>During ECC's review, it was noted that the Proponent has not assessed greenhouse gases (GHG) for this project, nor has a justification been provided as to why such an assessment was not undertaken. ECC has a broad mandate and policy framework with respect to GHG emissions and climate change, and plays a key role in addressing climate change through supporting research, science, and development of regulations to reduce GHG emissions. As a potential federal authority making a determination on the Project, it is important for ECC to have an understanding of the GHG emissions associated with the Project; as such, an assessment of GHGs should be conducted for the Project. The GHG assessment should include: &amp;#61623; An estimate of the direct and indirect greenhouse gas emissions associated with all phases of the Project as well as any mitigation measures proposed to minimize greenhouse gas emissions. This information is to be presented by individual pollutant and should also be summarized in CO2 equivalent per year; o Justify all estimates and emission factors used in the analysis o Provide the methods and calculations used for the analysis o Compare and assess the level of estimated emissions to the regional, provincial and federal emission targets &amp;#61623; Should residual greenhouse gas emissions remain after mitigation is applied, an analysis of the cumulative greenhouse gas emissions of current (e.g., facilities in operation) and reasonably foreseeable (e.g., proposed) projects should also be included in the cumulative effects assessment; &amp;#61623; Existing greenhouse gas emissions (GHG), in the project study area, by individual pollutant presented as kilotonnes of CO2 equivalent per year.</p>	<p>A greenhouse gas (GHG) assessment was not conducted as the expected facility direct and indirect GHG emissions during operations would be well under the BC Greenhouse Gas Emission Reporting Regulation threshold of 10,000 tonnes of carbon dioxide equivalent (t CO2e) and the facility does not meet the criteria as noted in the regulation: <a href="http://www.bclaws.ca/civix/document/id/lc/statreg/249_2015">http://www.bclaws.ca/civix/document/id/lc/statreg/249_2015</a> Nor does this facility meet the Federal criteria as noted in reporting criteria: <a href="https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/facility-reporting/reporting/quantification-requirements.html">https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/facility-reporting/reporting/quantification-requirements.html</a> As part of the Port of Prince Rupert Green Marine initiative Ridley Terminals has produced an annual GHG inventory since 2010. Annual operation GHG emissions have been under 10,000 t CO2e since 2010. In addition, Ridley Terminals Inc is working with the Prince Rupert Port Authority's environmental program to pursue feasible energy and emission reduction projects. At present the Port is in partnership with BC Hydro to initiate an Electrification Roadmap to determine areas within the Port's jurisdiction to supply and implement electrification.</p>

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ECC- 2 -2	Environment and Climate Change Canada	<p>In addition, ECCC has determined that this project may require an assessment of upstream GHG emissions that would take into consideration the Government of Canada's Interim Approach (January 2016). ECCC has conducted preliminary calculations that indicate that an upstream GHG assessment may be required; however, these results are based on a number of assumptions, as complete information has not yet been provided by the Proponent. In addition to the comments provided in Annex 1, ECCC requests that the following information be provided to determine whether an upstream GHG assessment would be required for this project: &amp;#61623; The types and quantities of materials handled, along with the annual and maximum capacity at proposed RTI new berth expansion. o The Project Description submitted by the Proponent does not explicitly state the additional quantity and type of export throughput that is expected with the Project. The new berth is designed to transport Liquified Petroleum Gas (up to 1.2 million tonnes) and but the quantity and type of dry-bulk exports is unknown. o In addition, the Project Description does not specify the annual or maximum capacity of the new berth, the expected online date or operational life. o The Project Description has noted that throughput products are sourced from western Canada but does not specify any further. &amp;#61623; An estimate of the distance rail travels from material production site to Terminal and the weight the rails carry. o The estimated distance and freight weight that the rails travel from material production sites to project terminal are unknown. o The distance traveled and the weight that the rails carry have an impact on the upstream GHG emissions. &amp;#61623; The expected operational life and online date of the proposed project.</p>	<p>The second berth would be built to primarily to accommodate Liquified Propane Gas (LPG) from the Ridley Island Propane Export Terminal. An assessment GHG emission was conducted for this propane terminal and it is expected that annual GHG emissions will be reported. An assessment of upstream GHG emissions for this terminal only included transport (rail traffic) and these emissions were noted to be outside of the Section 67 requirements. The rationale for not assessing GHG emissions from upstream oil and gas well production and processing was the point of not double counting given that upstream GHG emission have been assessed.</p>
ECC- 2 -3	Environment and Climate Change Canada	<p>As indicated by the Dredge Pocket Sediment Characterization for Disposal at Sea Technical Memorandum (February 12, 2019), the sediments in the load site are not suitable for disposal at sea. ECCC communicated to RTI (February 5, 2019) that this material will not be further considered for open water disposal; as such, at this time ECCC will not be making a determination on the significance of adverse environmental effects from the Project within the context of a disposal at sea permit.</p>	<p>Acknowledged that currently a disposal at sea permit is not being sought; however, ECCC have indicated they are prepared to work with RTI and PRPA to further investigate if disposal at sea may still be an option for this project.</p>

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Comment Code	Organization	Comment	Response
ECC- 2 -4	Environment and Climate Change Canada	Lastly, ECCC's comments provided in Annex 1 indicate that there is currently not sufficient information provided in the EEE to determine if a permit under the Species at Risk Act (SARA) would be required for the Project. Given this uncertainty, for purpose of issuing of a SARA permit, ECCC's role as a federal authority making a determination on the significance of adverse environmental effects from the Project is unconfirmed.	SARA provides protection to taxa listed under the Act, and within critical habitat. On federal land protection is provided to extirpated, endangered or threatened taxa. As outlined in the EEE, the only terrestrial species listed in these categories pursuant to SARA likely to be present at the wetland site is the little brown myotis bat, listed as schedule 1 endangered, Marbled Murrelet nesting habitat is not present. The little brown bat may forage over the wetland site. The Disposal Storage Site is not listed as critical habitat for either species. RTI does not expect that a permit under SARA will be required as potential effects on the species are 1) incidental to the project activities, 2) mitigation measures are provided and 3) the activity does not jeopardize the survival or recovery of the species.
ECC- 2 -5	Environment and Climate Change Canada	Executive Summary, page 4 Section 1.3, page 33 Given that the project now involves the disposal of dredge material on land, there is a possibility that a permit under the Species at Risk Act (SARA) will be required for the project to proceed. If a SARA permit is required, then this would trigger ECCC's responsibility to determine whether the Project is likely to cause significant adverse environmental effects under Section 67 of the Canadian Environmental Assessment Act, 2012 (CEAA 2012). Include the potential for an issuance of a SARA permit as an exercise of power or performance of duty that would trigger ECCC as a federal authority under Section 67 of CEAA 2012.	SARA provides protection to taxa listed under the Act, and within critical habitat. On federal land protection is provided to extirpated, endangered or threatened taxa. As outlined in the EEE, the only terrestrial species listed in these categories pursuant to SARA likely to be present at the wetland site is the little brown myotis bat, listed as schedule 1 endangered, Marbled Murrelet nesting habitat is not present. The little brown bat may forage over the wetland site. The Disposal Storage Site is not listed as critical habitat for either species. RTI does not expect that a permit under SARA will be required as potential effects on the species are 1) incidental to the project activities, 2) mitigation measures are provided and 3) the activity does not jeopardize the survival or recovery of the species.



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Comment Code	Organization	Comment	Response
ECC- 2 -6	Environment and Climate Change Canada	<p>Section 9.4.2, page 9.37; Section 12.4.2, page 12.18; Onshore Disposal Concept Overview - Technical Memorandum (Advisian); Dredge Pocket Sediment Characterization for Disposal at Sea - Technical Memorandum (Advisian) The Dredge Pocket Sediment Characterization for Disposal at Sea Technical Memorandum states that "sediments in the load site are not suitable for disposal at sea". This statement implies that the total volume of the dredge material may be disposed of on land. However, the potential effects from associated with on-land disposal are not fully understood. For example, the quality of the water discharged by the existing Sediment Disposal Site (SDS), or the anticipated discharge permit conditions for the SDS are not provided in the EEE. Therefore, it is not possible to fully assess the potential effects on water quality of water discharges from the SDS, especially effects when sediments containing higher concentrations of dioxins and furans are deposited in the facility. In addition, although the Dredge Pocket Sediment Characterization for Disposal at Sea Technical Memorandum outlines mitigation strategies for potential environmental effects associated with disposal of dredgeate onshore, they are not fully reflected in the body of the EEE in the applicable sections, such as 9.4.2 (Mitigation Measures - Marine and Anadromous Fish Effects) and 12.4.2 (Mitigation Measures - Human Health Effects). &amp;#61623; Assess the potential effects to water quality of introducing sediments with higher dioxins and furans concentrations to the SDS facility discharges. &amp;#61623; Describe the management of seepage from the SDS and how impacts to groundwater would be avoided or minimized. &amp;#61623; Update the EEE to fully reflect the mitigation strategies for potential environmental effects associated with disposal of dredgeate onshore laid out in the Dredge Pocket Sediment Characterization for Disposal at Sea Technical Memorandum (e.g., mitigation measures and monitoring proposed for spills and leaks).</p>	<p>Within the EEE, the onshore disposal option for construction of a disposal facility (DSS) in Parcel A assesses the effects of disposing the full volume of sediment as a conservative approach. Leachate testing is underway to characterize the discharge water quality and determine possible treatment requirements (if any), but this level of assessment is typically part of the permitting procedure rather than this initial approval stage. Note that the leachate samples were taken from the top 0.5 m of sediment in order to be representative of worst-case conditions for dioxin and furan concentrations. Application to PRPA for an agreement to discharge water will include submission of detailed information in relation to construction, containment, transport of sediment, water treatment, erosion and sediment control, safety, etc. Conditions imposed by PRPA as part of this discharge agreement will only be developed once the application process has been completed. To address the potential impacts at the S.67 stage, the EEE describes how discharges from the DSS will be of suitable quality when discharged to ground such that it will meet Marine Water Quality Guidelines in the marine environment. This intent will be documented in more detail in section 9.4.1 of the EEE. There are no aquifers or active water wells on Ridley Island, and groundwater in the vicinity is not used for drinking water (due to saline impacts) or industrial uses. The temporary discharge to ground from the DSS is not expected to have a significant impact on groundwater quality. Mitigations and monitoring measures are described in the CEMP with regard to spills and leaks during truck transport of dredgeate will be updated to provide further detail.</p>

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Comment Code	Organization	Comment	Response
ECC- 2-7	Environment and Climate Change Canada	<p>Executive Summary of the Project Description, page ii Section 2.5.2.2, page 20 The EEE states that "the proposed new berth will be designed to accommodate export of propane for the neighboring Ridley Island Propane Export Terminal (RIPET) via VLGCs (i.e., very large gas carriers) with the potential to accommodate dry-bulk ship loading in the future." In Section 2.5.2.2 the Proponent indicates that "Ridley Island Propane Export Terminal should offload 50 to 60 rail cars per day and load an additional 20 to 30 vessels per year (1.67 to 2.5 vessels per month, a portion of the increased operations) (SNC-Lavalin and AltaGas 2016)". Together, these two statements indicate that significant quantities of propane will be handled and transported from and between the two marine terminals. However, the EEE does not provide details on the expected quantities, mechanisms, rates, form or characteristics of potential contaminants that may be spilled or released to the environment as a result of accidents or malfunctions. Site-specific sensitivities and potential pathways of effects are also not identified. Without this information, ECCC cannot assess the full magnitude of the accident and malfunction scenarios presented. To assist in assessing the potential magnitude of accident and malfunction scenarios presented, ECCC requests that the Proponent provide details on the following: a) Outline the method of transfer of propane from Ridley Island Propane Export Terminal to RTI (i.e. via a pipeline or via rail cars?). b) Describe the need for propane storage tanks on the Project site. If required, provide further information about the storage tanks including their capacity, location on the Project site, and the preventive measures that will be put in place around the storage tanks that will safe guard against accidental releases of propane to the atmosphere and possible ignition.</p>	<p>The requirement for an assessment of the environmental effects of accidents and malfunctions is solely applicable to designated projects under CEAA 2012. An evaluation of safety risks associated with the proposed operations will be a component of the design and engineering review undertaken by PRPA which is external to the s67 process. However, relevant preventative and contingency measures for accidents and malfunctions have been summarized in the EEE at the request of technical committee members. There will be one expanded marine terminal, and propane will be transported from the RIPET facilities to the transfer facilities at the terminal. Details of the quantities and characteristics of the propane as well as spill response plans and pathways are provided in the RIPET EEE.</p>

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Comment Code	Organization	Comment	Response
ECC- 2 -8	Environment and Climate Change Canada	Section 18.1, page 170 The Proponent states that: "For those incidents with loss of LPG, the LPG will vaporize once it hits the water and the vapour cloud will safely disperse, and outside the marine safety zone the propane will be sufficiently dispersed (less than &#189; Lower Flammable Limit) such that ignition is unlikely. The Port Information Guide, PRPA 2017, presents a 50 m safety zone for ships at berth, however may promulgate tanker specific zones." The above statement speaks only to the dispersion of propane vapour outside of the 50 m safety zone for ships at berth. There are no details provided for propane vapour behavior and dispersion within the 50 m safety zone nor are there any details provided that speak to any prevention, preparedness or response measures that are specific to within the 50 m safety zone. Without this information, ECCC cannot assess the full magnitude of what a worst-case accident and malfunction scenario could entail. To further inform an assessment of the full magnitude of what a worst-case accident and malfunction scenario could entail, ECCC suggest that the Proponent provide details on the preventive measures, emergency preparedness plans and associated response capacities in place to prevent, manage and mitigate an accidental or uncontrolled propane release within the 50m marine safety zone for gas carriers at berth. Provide information on any VCs identified within this 50m marine safety zone, as well as any environmental effects that could result from a significant release of propane.	The requirement for an assessment of the environmental effects of accidents and malfunctions is solely applicable to designated projects under CEAA 2012. An evaluation of safety risks associated with the proposed operations will be a component of the design and engineering review undertaken by PRPA which is external to the s67 process. However, relevant preventative and contingency measures for accidents and malfunctions have been summarized in the EEE at the request of technical committee members. We note that RTI already has an emergency response plan, in compliance with PRPA, that will be updated. Further, the proponent for the RIPET project has completed an assessment for propane and has or will be providing spill response and emergency response plans relevant to the handling of propane within and without the 50 m safety zone.
ECC- 2 -9	Environment and Climate Change Canada	Section 18.1, page 170 In Section 18.1 the Proponent indicates that "Because accident and malfunctions are unplanned or unexpected events that are unlikely to occur, associated environmental effects from the accident and malfunction events were assessed as unlikely to occur and no significant residual effects to the environment or human health were identified (SNC Lavalin 2016)." In ECCC's experience, such statements are typically supported by the findings of a Hazard Identification and Risk Assessment. Without being able to review a Hazard Identification and Risk Assessment report wherein environmental consequences are weighed against incident probabilities in order to establish risk, ECCC cannot support the conclusion that there are no significant residual effects to the environment or human health from a potential accident and malfunction event. Provide details on the following: &#61623; If the Ridley Island Propane Export Terminal Environmental Evaluation Document (SNC-Lavalin, and AltaGas Ltd. 2016) contained a Hazard Identification and Risk Assessment. &#61623; If so, provide details on the following: a. Was the risk assessment qualitative or quantitative? b. The identified hazards, valued components, environmental consequences and residual effects from a worst-case accident or malfunction scenario.	Detailed information provided by RIPET is included in their website for this project (Section 15). The methodology identified potential interactions between project VCs and ICs, accident scenarios, and potential effects on the environment and human health. For more information please see: <a href="https://www.altagas.ca/sites/default/files/2016-12/R1206mba_Ridley%20Terminal%20LPG%20EED_updated_FINAL.pdf">https://www.altagas.ca/sites/default/files/2016-12/R1206mba_Ridley%20Terminal%20LPG%20EED_updated_FINAL.pdf</a>

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Comment Code	Organization	Comment	Response
ECC- 2 -10	Environment and Climate Change Canada	Section 18.2, page 170 The Proponent indicates "Safety Protocols related to the transfer of propane from storage to the carriers will be established by AltaGas for RTI consistent with practices used in other similar propane facilities to ensure that human errors leading to leaks or accidents at propane facilities on the marine wharf are avoided or minimized. The RTI Emergency Response Plan will be reviewed and updated as needed to address safe marine operations and response to propane related accidents and spills, in support of PRPA and RTI marine and shore-based safety plans." ECCC requires more information on any enhanced marine safety requirements for the large gas carriers that will call on RTI to assess if enhanced marine safety and navigation will play an integral role in the prevention of accidents and malfunctions at the RTI terminal. Provide details on the following: a) Will there be enhanced tug escort requirements for gas carriers calling on the RTI marine terminal, or on PRPA in general? b) Will there be mandatory pilotage requirements for gas carriers calling on the RTI marine terminal, or on PRPA in general? c) Has a Transport Canada TERMPOL review for marine navigation and safety been considered for this project?	Responses here to questions a) and b) are drawn from the RIPET report Section 15. These responses, reflected in the EEE, are RTI's understanding of PRPA and pilotage requirements. a) Tethered tugs will accompany all carriers in transit and berthing within PRPA marine jurisdiction; b) Qualified marine pilots with local knowledge base will be used. A Transport Canada TERMPOL review has not been prepared for this project, was not discussed at the Technical Committee process. It is not required and is not deemed necessary. A Quantitative Risk Assessment was discussed with PRPA as part of the detailed engineering phase related to PRPA's responsibilities as the administrator of the lands and navigational jurisdiction.
ECC- 2 -11	Environment and Climate Change Canada	Section 12.0, page 198 The air quality and health effects assessment conclusions were developed using the 2016 Prince Rupert Airshed Study, however, this study does not account for the incremental activity, including the number of vessels, of this Project. While references to previously completed air assessments can provide background information, they cannot account for the specific and incremental activities related to the Project activities. In addition, the number of vessel movements referenced throughout the report is inconsistent. Emissions from all sources arising from all aspects of the project have not been characterized including gaseous fugitive emissions from handling and transport of propane. Assess air quality impacts from all emission sources arising from project, and provide consistent estimates of vessel movements.	Air emission sources from the facility are limited to cargo handling equipment, Onroad, rail and marine activities. These combustion emissions are expected to be low. Impacts due to marine emissions were assessed in the Ridley Island Propane Export Terminal environmental assessment and the overall impacts were assessed as not significant with regards to air quality and human health. As part of the Port of Prince Rupert Green Marine initiative Ridley Terminals has produced an annual Energy and Emission Inventory since 2010. Annual operation emissions have reduced from various energy efficiency initiatives and the use of Ultra Low Sulphur Fuel (NOx by 21%, PM2.5 by 73% and Sox by 97%) since 2010. In addition, Ridley Terminals Inc is working with the Prince Rupert Port Authority's environmental program to pursue feasible energy and emission reduction projects. The Port in partnership with BC Hydro is initiating an Electrification Roadmap to determine areas within the Port's jurisdiction to supply and implement electrification.
ECC- 2 -12	Environment and Climate Change Canada	Section 12.5, Table 12.4, page 212 The Summary of Residual Effects for Human Health was developed without providing any supporting information or data to support the conclusions. Additionally, no air quality data was provided for the Project. The Proponent did not quantify emissions in order to determine that they are indeed small, nor did they provide details on any screening assessments that would result in the decision not to advance to a modelling assessment. In the absence of supporting information or data, ECCC cannot validate the conclusions as provided in Table 12.4. Provide information or data to support the conclusions provided in Table 12.4.	There are no major air emission sources at the existing or proposed facility. The emissions are limited to cargo handling equipment, Onroad mobile, rail and marine activities. These emissions will be much less than the neighbouring Ridley Island Propane Export Terminal which concluded that impacts to air quality and human health were not significant.

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Comment Code	Organization	Comment	Response
ECC- 2 -13	Environment and Climate Change Canada	Dredge Pocket Sediment Characterization for Disposal at Sea Technical Memorandum As indicated by the Dredge Pocket Sediment Characterization for Disposal at Sea Technical Memorandum (February 12, 2019), the sediments in the load site are not suitable for disposal at sea. ECCCC communicated to Advisian (February 5, 2019) that this material will not be further considered for open water disposal; as such, at this time ECCCC will not be making a determination on the significance of adverse environmental effects from the Project within the context of a disposal at sea permit. Subsequently, ECCCC has not reviewed the Disposal at Sea information provided in the EEE. Should new information become available that would support consideration of the dredge material for disposal at sea, then RTI would need to amend the environmental effects evaluation and reconvene the technical committee to address issues pertaining to Disposal at Sea.	The requirements for a DAS application will require detailed information to be submitted and consulted on as part of the permit application process. It is not anticipated that there would be significant changes to the EEE as a result of submittal of a DAS application to ECCCC. It is therefore expected that a S.67 addendum issued by ECCCC would not require a significant consultation effort, with consultation being focussed through the DAS permit application.
TRC- 3 -1	Transport Canada	The Navigation and Navigational Safety Effects Evaluation section of the Executive Summary describes potential impacts to navigation, but does not mention vessel activities at the new berth and potential interactions with nearby vessel movements. Please reflect this potential impact in this section of the Executive Summary.	The Executive Summary has been revised accordingly to include a summary of potential Project interactions with vessels at and near the new berth.
TRC- 3 -2	Transport Canada	Transport Canada (TC) recommends adjusting this sentence relating to the Navigation Protection Act for accuracy. TC suggests the following: Transport Canada would require submission of a Notice of Works for an authorization under the Navigation Protection Act.	The sentence "Transport Canada will require a Notice of Works or Approval under the Navigation Protection Act " on page 1.6 will be revised to "Transport Canada would require submission of a Notice of Works for an authorization under the Navigation Protection Act."
TRC- 3 -3	Transport Canada	TC recommends adjusting the opening sentence of this section to the following: The Navigation Protection Act, administered by Transport Canada, requires authorization of works that are to be placed on, over or under navigable waters, with some exceptions for minor works that are set out in the regulations.	The sentence in Section 1.3.1: "The Navigation Protection Act, administered by Transport Canada, requires approval of works that are to be placed on, over or under navigable waters, with some exceptions for minor works that are set out in regulations" has been revised to read "The Navigation Protection Act, administered by Transport Canada, requires authorization of works that are to be placed on, over or under navigable waters, with some exceptions for minor works that are set out in the regulations."
TRC- 3 -4	Transport Canada	The description of work not substantially interfering with navigation should be adjusted for accuracy. TC recommends the following: "if the work will not substantially interfere with navigation, an authorization will permit the work to proceed."	The sentence in Section 1.3.1: "The Navigation Protection Act, administered by Transport Canada, requires approval of works that are to be placed on, over or under navigable waters, with some exceptions for minor works that are set out in regulations" has been revised to read "The Navigation Protection Act, administered by Transport Canada, requires authorization of works that are to be placed on, over or under navigable waters, with some exceptions for minor works that are set out in the regulations."

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Comment Code	Organization	Comment	Response
TRC- 3 -5	Transport Canada	The dimensions for the new berth provided on pages 2.6 and 2.9 of the EEE are not consistent with the dimensions of the new berth provided on page ii of the Executive Summary. Please ensure the dimensions for the berth are consistent.	EEE revised to include the following dimensions: Bulk solids vessel Nominal 70,000 DWT L = 236 m B = 32.3 m D = 13 m without tide assist LPG Vessel 55,000 DWT L = 240 m B = 42 m D = 13 m
TRC- 3 -6	Transport Canada	Please update the section titled Public Engagement Options, as table 3.1 is incomplete and there are placeholders in the text.	This section will be complete for the final version of the EEE
TRC- 3 -7	Transport Canada	Transport Canada recommends that the installation of piles and construction of the trestle during construction, as well as the removal of berth infrastructure during construction, be ranked as "1" rather than "0" for interaction with navigation and navigational safety. This will reflect the potential for these project activities and physical works to have a minor impact on navigation and navigation safety.	As requested, in Table 7.1 the installation of piles and construction of the trestle during construction, as well as the removal of berth infrastructure during construction has been ranked as "1" rather than "0" for interaction with navigation and navigational safety. Table 13.1 also reflects these changes.
TRC- 3 -8	Transport Canada	Transport Canada notes that the anticipated vessel calls at the berth for year seem to be reported as 20 to 30 on page 8.20 and 84 on page 8.23. Please clarify the anticipated number of vessel calls per year and ensure consistency in the EEE.	EEE revised for consistency to indicate an additional 20 to 30 vessel calls per year.
TRC- 3 -9	Transport Canada	TC notes that the Navigation Protection Act would be replaced with the "Canadian Navigable Waters Act" rather than the "Navigable Waters Act."	The text on page 13.2 line 1 has been revised to read "Canadian Navigable Waters Act".
TRC- 3 -10	Transport Canada	Transport Canada recommends that the dredging for berth pocket during construction and removal of berth infrastructure during decommissioning be ranked as "1" rather than "0" for interaction with navigation and navigational safety. This will reflect the potential for these project activities and physical works to have a minor impact on navigation and navigation safety.	In Table 13.1, Project activities of dredging for berth pocket during construction and removal of berth infrastructure during decommissioning has been ranked as "1" rather than "0" for interaction with navigation and navigational safety. Table 7.1 reflects these changes.
TRC- 3 -11	Transport Canada	Under the Physical Disturbance heading, construction activities are "not considered likely to affect navigation of other marine users." The Navigation Protection Program's view is that construction activities would have a minor impact on navigation in inclement weather due to potential interaction of vessels with bulk carriers approaching the berth. TC recommends this sentence be updated to reflect this impact on navigation.	The text in Section 13.4.1.2 has been updated to reflect Transport Canada's request to change the potential effect of construction activities on navigation and navigation to a minor effect. This change is reflected in the discussion of residual effects.

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Comment Code	Organization	Comment	Response
TRC- 3 -12	Transport Canada	The Physical Disturbance heading states "Small vessels use the semi-protected shallow passage between Coast Island and Ridley Island in inclement weather." Please update the EEE to clarify how small vessel use of this shallow passage in inclement weather would be impacted by the project.	The text related to small vessel use of the passage between Coast Island and Ridley Island on page 13.12 has been expanded and clarified to describe the potential interactions between Project activities and this use. For example, small vessels using this route during Project construction may need to alter their route to navigate around the new berth area and any associated construction vessels. Navigation safety of small vessels may be affected if vessels are required to change their route farther out to sea, or if activities at the new berth are not fully detectable due to poor weather or other factors.
TRC- 3 -13	Transport Canada	The Physical Disturbance heading states "Negligible effects on navigation and navigation safety are associated with maintenance dredging during Project operation, since maintenance dredging will be periodic and confined to the dredge pocket area." TC recommend these effects on navigation and navigation safety be described as "minor" rather than "negligible" since activities in the dredge pocket area could impact navigation of small vessels wanting to navigate in that area in inclement weather.	We will be updating this section because frequent maintenance dredging is not expected at the Berth Expansion Project. RTI have not required maintenance dredging at the existing adjacent berth in the 35 years since it has been in operation and the sediment deposition rate at the new berth is not expected to be substantially different based on current studies completed for the berth expansion. If maintenance dredging is required, this would be assessed and permitted through the appropriate regulatory authorities.
TRC- 3 -14	Transport Canada	The Physical Disturbance heading states "Potential effects of Project decommissioning are not carried forward for further assessment." TC notes that decommissioning would require submission of a Notice of Works to TC's Navigation Protection Program, and may be subject to requirements of other relevant legislation at the time of decommissioning.	The information provided by Transport Canada on decommissioning requirements (Submission of Notice of Works to TC Navigation Protection Program and other requirements as noted) is now included in section 13.1 and 13.1.1 (Regulatory Context), and page 13.9 (Line 33).
TRC- 3 -15	Transport Canada	TC recommends that mitigation for construction include the measure identified as mitigation (page 13.14, line 7 to 9) during operation for development and implementation of marine communication protocols	In response to Transport Canada's request, the operation phase mitigation on marine communication protocols: "Continue to post estimated vessel arrival and departures on Ridley Terminals' website" and "Develop and implement marine communication protocols to facilitate communication between Project vessels and other marine users, including Aboriginal groups, fishing industry organizations and other affected marine users" are included as construction mitigation. In addition, facilitating communication with other facilities is now added to the measure.
TRC- 3 -16	Transport Canada	TC recommends the mitigation measure for development and implementation of marine communication protocols also facilitate communication with adjacent facilities, who may benefit from these communications.	In response to Transport Canada's request, the operation phase mitigation on marine communication protocols: "Continue to post estimated vessel arrival and departures on Ridley Terminals' website" and "Develop and implement marine communication protocols to facilitate communication between Project vessels and other marine users, including Aboriginal groups, fishing industry organizations and other affected marine users" is included as construction mitigation. In addition, facilitating communication with other facilities has been added to the measure.

This Comment/Response Table is in draft form only, and is subject to further review and revision

Comment Code	Organization	Comment	Response
TRC- 3 -17	Transport Canada	TC recommends that the description of geographic extent for the effect under the Disruption of Navigation by Other Marine Users During Operation heading reflect that the project may interact with small vessels in close proximity to the berth in periods of inclement weather.	The information on small vessel use of the area proximal to the new berth in inclement weather has been added to the description of Geographic Extent, per Transport Canada's request.
TRC- 3 -18	Transport Canada	TC recommends that the description of frequency for the effect under the Disruption of Navigation by Other Marine Users During Operation heading reflect that disruption of navigation will also be dependent on the frequency of periods of poor weather.	The information supplied by Transport Canada on frequency of inclement weather affecting the frequency of the potential effect (Page 13.15, Line 27-28) has been added to the description of Frequency, per Transport Canada's request.
TRC- 3 -19	Transport Canada	TC recommends that development of Marine Communication Protocols be listed as a mitigation measure in Table 13.2 for effects during construction, in addition to the mitigation identified for operations.	Communication protocols for the operation phase have been updated in Table 13.2 as requested.
TRC- 3 -20	Transport Canada	TC recommends that the mitigation measure in Table 13.2 for communication of vessel arrivals and departures during operations include coordination with vessels calling to adjacent berths.	Communication protocols for the operation phase have been updated in Table 13.2 as requested.
TRC- 3 -21	Transport Canada	TC recommends mitigation measures for disruption of navigation by other marine users during construction and operations (1 st entry under the Navigation and Navigation Safety heading) include the marine communications plan referenced above.	Communication protocols for the operation phase have been updated in Table 15.1 as requested.
TRC- 3 -22	Transport Canada	TC recommends that the PRPA Construction Coordination Committee, in addition to the Aboriginal communities referenced in the first mitigation measure listed for item number 24 of the table, receive a project implementation schedule ahead of construction and at any time when revisions to this schedule are made.	Mitigation Commitment #24 is now updated to read: "Provide Aboriginal communities and the PRPA Construction Coordination Committee with a project implementation schedule ahead of construction and at any time when revisions to this schedule are made".
TRC- 3 -23	Transport Canada	TC recommends the mitigation table specify that the Construction Environmental Management Plan will include the marine communications plans referenced above.	The text on Page 15.11 has been revised to include a statement that the CEMP will include the marine communications protocols/plans noted in Table 13.2.
TRC- 3 -24	Transport Canada	TC notes that the Conclusions section is missing. Please ensure this section is completed.	The Conclusions section will be completed for the final version of the EEE.



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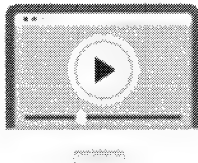
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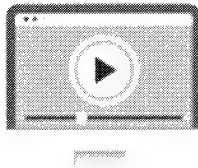
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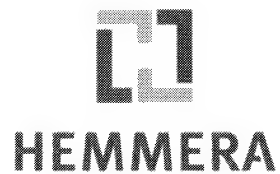
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**Delta Irrigation Enhancement Project  
CEAA Screening Report**

Prepared for:  
**MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE**  
Metrotower 1, Suite 2400 – 4710 Kingsway  
Burnaby, BC V5H 4M2

Prepared by:  
**HEMMERA**  
250 – 1380 Burrard Street  
Vancouver, BC V6Z 2H3

File: 285-014.03  
April 2010

Hemmera Envirochem Inc.  
Suite 250, 1380 Burrard Street  
Vancouver, BC V6Z 2H3

Telephone: 604-699-0434  
Facsimile: 604-699-0430  
[www.hemmera.com](http://www.hemmera.com)

## EXECUTIVE SUMMARY

The proposed Delta Irrigation Enhancement Project (DIEP) consists of enhancing the existing drainage and irrigation network that supports agricultural activities in southwest Delta. The DIEP is a component of the Agricultural Enhancement Strategy that has been proposed by the Ministry of Transportation and Infrastructure (MoT) to mitigate impacts to agricultural land as a result of the construction of the South Fraser Perimeter Road (SFPR) project. The Project is located within a rural agricultural setting, with the intake at the lower reaches of the Fraser River and 80<sup>th</sup> Street, and connecting south towards 64<sup>th</sup> Street and east toward 112<sup>th</sup> Street and Highway 91. The surrounding landscape consists of agricultural land, cultivated fields, railways, roadways and residential properties.

This Canadian Environmental Assessment Agency (CEAA) screening level report has been prepared to predict the potential environmental impacts of the proposed Project, and to recommend measures to mitigate or avoid these potential impacts. The methodology for this impact assessment consisted of desktop research into existing environmental impact assessments similar to a project of this nature, along with field assessments of current site conditions. The potential biophysical impacts identified and assessed in this report are focused to those potential impacts to wildlife and riparian habitat directly within the DIEP alignment and are mainly associated with the construction phase of the Project. The potential socioeconomic impacts include the anticipated temporary impacts relating to land use, archaeology, navigable waters, cultural values and sensory disturbances during construction and operational phases of the proposed Project.

Positive effects are anticipated for fish habitat and access, land use (irrigation and agriculture) and navigable waters upon completion of the Project. The DIEP is expected to enhance irrigation opportunities to optimize agricultural potential in the area and enhance fish habitat through increased water availability and connectivity within the area. As determined through this report, the anticipated adverse residual impacts to the environment are considered negligible or low as mitigation and rehabilitation are considered options for reducing long-term impacts, and cumulative effects are not expected. The development of an Environmental Management Plan (EMP) prior to the start of construction, along with associated environmental monitoring, is recommended during the construction and operational phases to ensure that the recommended mitigation measures are being implemented. With these measures and considerations in place, residual adverse environmental impacts are not expected from this Project.

## ACRONYMS

ALC	Agricultural Land Commission
ALR	Agricultural Land Reserve
BCEAA	British Columbia Environmental Assessment Agency
BC Rail	British Columbia Rail way
BMP	Best Management Practices
CAC	Criteria Air Contaminants
CEAA	Canadian Environmental Assessment Application
CN Rail	Canadian National Rail
CoD	Corporation of Delta
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
dBA	Decibels
DIEP	Delta Irrigation Enhancement Project
DFI	Delta Farmers Institute
DFO	Federal Department of Fisheries and Oceans
EMP	Environmental Management Plan
FISS	Fisheries Information Summary System
FVRD	Fraser Valley Regional District
GVRD	Greater Vancouver Regional District
MAL	Ministry of Agriculture and Land
MoT	British Columbia Ministry of Transportation and Infrastructure
NSEP	National Water Supply Expansion Program
NWPA	Navigable Waters Protection Act
NWPD	Navigable Waters Protection Division
PEP	Provincial Emergency Program
SARA	Species At Risk Act
SFPR	South Fraser Perimeter Road Project



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## 1.0 INTRODUCTION

The BC Ministry of Transportation and Infrastructure (MoT) is proposing to upgrade an existing drainage and irrigation network that supports agricultural activities in southwest Delta. The proposed Delta Irrigation Enhancement Project (DIEP), the „Project“, is a component of the Agricultural Enhancement Strategy that has been proposed by MoT to mitigate impacts to agricultural land as a result of the construction of the South Fraser Perimeter Road (SFPR) project. Due to the extent and nature of the proposed works, the Project will require a screening level environmental assessment (EA) under the *Canadian Environmental Assessment Act*. This screening level EA report has been developed to meet the requirements of the *Canadian Environmental Assessment Act* (CEAA). The DIEP is located in the Corporation of Delta (CoD), British Columbia and is proposed to provide an estimated 2.1 metres<sup>3</sup>/second (m<sup>3</sup>/s) of water flow to agricultural areas within southwest Delta.

### 1.1 PROJECT RATIONALE

The DIEP is being undertaken to offset the loss of agricultural land related to the construction of the SFPR project and to comply with the Agriculture Lands Commission (ALC) permit for works on Agriculture Land Reserve (ALR) lands by the SFPR project. The DIEP is a product of the MoT, Gateway Program's Agricultural Enhancement Strategy, to increase agricultural productivity in the CoD, while mitigating impacts associated with the SFPR project. When constructed, the 28.1 kilometre (km) long DIEP will provide water to approximately 7,840 hectares (ha) of land in Delta, of which 6,300 ha is active agricultural land and productivity is currently constrained by a lack of access to quality irrigation water.

### 1.2 PROJECT ALIGNMENT OPTION ALTERNATIVES

The proposed Project alignment discussed in this report was chosen following the review of three alignment options. The Project alignment options that were considered are discussed below and summarized in **Table 1**.

#### 1.2.1 Alternative 1 – Two Intake Pump Stations

The Alternative 1 option would provide irrigation water from two pump stations on the Fraser River foreshore; one located at the base of 80<sup>th</sup> Street, and the other located at the existing North East Flood Box beneath the Highway 91 - Alex Fraser Bridge.

The 80<sup>th</sup> Street pump station would provide service to the west and southwest areas of Delta, delivering about 75% of the total irrigation demand. The primary delivery route would be south within existing ditches adjacent to the SFPR alignment to the 72<sup>nd</sup> Street lift station, and further south and west along the railroad alignment to Deltaport Way. The 72<sup>nd</sup> Street lift station would also provide service to parts of east Delta via Centre Slough. Proposed improvements to the existing conveyance system (i.e., ditches,

culverts, etc.) that originate from the 80th Street intake would include upgrading the 80<sup>th</sup> Street pump station to ensure a 3,200 litre/second (L/s) supply, modification of the flood box, and improvements to the anti-salinity controls. Improvements to the flood box and the construction of three additional lift stations along the conveyance would also be required.

The Highway 91 pump station would provide service to East Delta and deliver the remaining 25% of the total irrigation demand. The primary delivery route would be west along River Road and south along Nordel Way and Highway 91 to 64<sup>th</sup> Avenue, continuing south along 104<sup>th</sup> and 112<sup>th</sup> Streets and east via Centre Slough. This eastern irrigation alignment would require installing a pump station at the North East Flood Box, with the capability to supply 1,200 L/s, a newly installed 1,000 mm diameter forcemain extending from the pump station to the Highway 91/64<sup>th</sup> Avenue interchange (an elevated point in proximity to existing ditches at 60<sup>th</sup> Avenue and 112<sup>th</sup> Street), construction of one additional lift station and improvements to the existing ditch network south along 104<sup>th</sup> to Centre Slough.

The constraints identified through consideration of Alternative 1 included crossing the area associated with the proposed SFPR/Highway 99 Interchange; construction through dense industrial areas; and proximity to the environmentally sensitive Burns Bog.

#### **1.2.2 Alternative 2 – One Intake Pump Station at 80<sup>th</sup> Street**

The Alternative 2 option would rely upon the total water demand being provided by one pump station at the base of 80<sup>th</sup> Street. Similar improvements to the existing irrigation system would be required as described in Alternative 1, with the exception of the east Delta irrigation force main/pump station along Highway 91. Three additional control gate structures within the east Delta irrigation system south of Ladner Trunk Road at 104<sup>th</sup> Street Ditch and Big Slough would also be required.

The primary constraint identified for Alternative 2 was crossing the area associated with the proposed SFPR/Highway 99 Interchange.

#### **1.2.3 Alternative 3 – One Intake Pump Station Upstream of 80<sup>th</sup> Street**

The Alternative 3 option would be similar to Alternative 2, with the exception of a 1,000 millimetre (mm) diameter forcemain directed west from the pump station at the Highway 91 North East Flood Box to the 80<sup>th</sup> Street irrigation alignment, rather than south along Highway 91 and Burns Bog.

The constraints identified for Alternative 3 were crossing the area associated with the SFPR/Highway 99 Interchange and construction through dense industrial areas.

**Table 1 Key Features of Three Project Alternatives**

Features	Alternative 1	Alternative 2	Alternative 3
Intake pump station	2	1	1
Force main	7.7 km	0.9 km	5.3 km
Earth channel	24.7 km	22.9 km	22.8 km
Supported channel	1.3 km	1.3 km	1.3 km
Culverts	1.4 km	1.4 km	1.4 km
Lift stations	1	2	2
Water level control gates	3	6	6
<b>TOTAL LENGTH OF DISTRIBUTION SYSTEM</b>	<b>35.1 km</b>	<b>26.4 km</b>	<b>30.4 km</b>

#### 1.2.4 Design Alternatives Analysis

These three Project alignment options were considered to provide nearly identical enhancements to the irrigation network. A strategic environmental assessment and preliminary cost evaluation were conducted to determine which of the three alternatives provided the most efficient conveyance with minimal impacts to existing agricultural lands and environmentally sensitive areas. Alternative 2 was selected for detailed evaluations because it was anticipated to provide the service at the least capital cost combined with the least potential for environmental impacts (based on distance from the sensitive Burns Bog ecosystem). As such, Alternative 2 was chosen as the selected alignment for the Project, and has been the basis for the current Project alignment (**Figure 1**) and development of this screening level EA.

### 1.3 REGULATORY CONTEXT

CEAA establishes a process for determining the environmental effects of projects, as well as the responsibilities and procedures for the environmental assessment of projects involving the Federal government. CEAA is applicable to any project where a federal authority performs one or more of the following CEAA triggers in respect of a project:

- Is the proponent of a project (Section 5.(1)(a));
- Grants money or any other form of financial assistance to the project (Section 5.(1)(b));
- Leases, sells or disposes of land to enable a project to be carried out (Section 5.(1)(c)); or
- Exercises a regulatory duty in relation to a project, such as issuing a permit or license that is included in the Law List prescribed by the regulations to CEAA (Section 5.1(d)).

With respect to the DIEP, it is anticipated that the proposed project could potentially impact fish and fish habitat during the construction phase, and will require an *Authorization* under the *Fisheries Act*. Transport Canada may have an interest in watercourses potentially affected by the DIEP that are considered navigable and subject to approval under the *Navigable Waters Protection Act*. The Canadian Wildlife

Service may have interest in the DIEP based on the presence of species at risk and migratory birds along the alignment, protected under the *Migratory Birds Convention Act* and the *Species at Risk Act*.

Potential federal, provincial, and municipal permits and/or authorizations that may be required prior to DIEP works are identified in **Table 2**.

**Table 2: Permits that may be required for the DIEP**

<b>Federal Legislation</b>	<b>Permit</b>	<b>Relevant Component</b>
Canadian Wildlife Service, <i>Species at Risk Act</i>	Section 73 Permit	Impacts to federally listed Species at Risk
Canadian Wildlife Service, <i>Migratory Birds Convention Act</i>	Section 4 Permit	Impacts to federally listed Migratory Birds
Fisheries and Oceans Canada, <i>Fisheries Act</i>	Section 35 (2) Authorization Permit	Impacts to fish habitats
Transportation Canada, <i>Navigable Waters Protection Act</i>	Approval Permit	Impacts to a navigable watercourse
<b>Provincial Legislation</b>	<b>Permit</b>	<b>Relevant Component</b>
<i>Heritage Conservation Act</i>	Section 14 Site Investigation Permit Section 12 Site Investigation Permit	Potential archaeological site identified in project area
Ministry of Agriculture and Lands, <i>Agricultural Lands Commission Act</i>	Subdivision and Procedure Regulation Application	Acquired land in ALR
Ministry of Environment, <i>Water Act</i>	Section 9 Notification and Approvals Permit	Changes in and about a stream
Ministry of Environment, <i>Wildlife Act</i>	Type 2(c)(i) Wildlife Sundry Permit	Collection and salvage of fish/wildlife
<b>Municipal Permits and Approvals</b>	<b>Permit</b>	<b>Relevant Component</b>
Tree Cutting (Burns Bog)	Permits #6122 and #6336	Tree cutting permit for Burns Bog; regulation of tree removal
Soil removal and Deposit	Permit #5532	Regulates the removal and deposit of soil
Noise Control	bylaw #1906	Regulates periods of construction exceeding noise limits
Noxious Weed	Bylaw #141	Control the spread of noxious weeds
Waterways Protection	Bylaw #1615	Regulates watercourse obstructions
Streamside Protection and Enhancement	Bylaw #6349	Provides requirements for development along streams

#### **1.4 PROPONENT**

The Proponent is the MoT and Hemmera is the Proponent Consultant. Communications with respect to the Project should be directed to:

##### **Ministry of Transportation and Infrastructure**

Matthew Hunter, DIEP Project Manager  
Ministry of Transportation  
Metrotower 1, Suite 2400 – 4710 Kingsway  
Burnaby BC V5H 4M2  
Phone: 604.775.0487  
Email: [Matthew.Hunter@GatewayProgram.bc.ca](mailto:Matthew.Hunter@GatewayProgram.bc.ca)

##### **Proponents Consultant**

Jim Roberts, Environmental Permitting Manager  
Ministry of Transportation  
Metrotower 1, Suite 2400 – 4710 Kingsway  
Burnaby BC V5H 4M2  
Phone: 604-775-0495  
Email: [Jim.Roberts@GatewayProgram.bc.ca](mailto:Jim.Roberts@GatewayProgram.bc.ca)

## 2.0 PROJECT DESCRIPTION

### 2.1 PROJECT LOCATION

The Project is located in the CoD, originating with the intake pipe and pump station along the Fraser River at the base of 80<sup>th</sup> Street; conveying water south through existing irrigation ditches along the general SFPR alignment to 64<sup>th</sup> Street and BC Rail tracks; west from 72<sup>nd</sup> Street to Deltaport Way at 46A Street; and east from 72<sup>nd</sup> Street along Churchill Street to north of Ladner Trunk Road (**Figure 1**).

### 2.2 PROJECT OVERVIEW

When constructed, the DIEP will provide water to approximately 7,840 ha of land in south-west Delta, of which 6,300 ha is actively farmed agricultural land within the CoD. The 28 km long DIEP alignment will be directed through existing drainage ditches associated with linear infrastructure, such as the SFPR project, BC Rail corridor and municipal road network. The majority of affected lands are under either provincial or municipal ownership. There are some portions of the DIEP that are located within areas of private land ownership. There is no federal land required for the DIEP. All proposed works that are not located on provincial lands will be undertaken with the full agreement and acceptance of the landowners.

For the purposes of this report, the DIEP alignment will be described, where appropriate, in general ditch segments: North Ditch, West Ditch, South Ditch, and East Ditch. These segments are described in **Table 3** and will be referred to in subsequent sections in this report.

**Table 3 DIEP Alignment Ditch Segment Descriptions**

DIEP Segment	Segment Origin	Segment Continuation
North Ditch	Intake pipe within the Fraser River at the 80 <sup>th</sup> Street and River Road.	Extends south along the SFPR to Crescent Slough and continues south toward Airport Ditch and Monastery Ditch ( <b>photos 1-3</b> ).
South Ditch	Monastery Ditch and BC Rail Ditch	Extends south via BC Rail Ditch, parallel to the SFPR and BC Rail tracks to 64 <sup>th</sup> Street ( <b>photos 4-7</b> ).
West Ditch	Monastery Ditch at Airport Ditch	West Ditch continues west via Monastery Ditch to Arthur Drive Way. It then continues south via Chillukthan Slough, crossing Arthur Drive at 34B Avenue and continuing southwest to Deltaport Way, east of 46A Street ( <b>photos 8-11</b> ).
East Ditch	Centre Slough at 72 <sup>nd</sup> Street	Travels east from south ditch along Centre Slough to the confluence with Big Slough at 104 <sup>th</sup> Street Ditch. It continues north along Big Slough, crossing under Highway 99 and then meandering northeast until the Big Slough control gate. At this point it heads north again, crossing under Ladner Trunk Road and continuing north for approximately 700 m ( <b>photos 12-22</b> ).



The Project will include the installation of a pump station, culverts, sierra walls, control gates, lift stations and improvements to the salinity controls and refurbishment to existing infrastructure. The design concept (**Figure 1**) identifies the primary irrigation channel (highlighted in orange) where construction of new ditches and expansion of existing ditches will occur to convey irrigation water along the main DIEP alignment. Secondary network enhancement channels (highlighted in purple) are areas outside the main DIEP alignment where existing ditches and irrigation infrastructure will be enhanced.

The scope of work for the DIEP includes:

- Construction of pump station at 80<sup>th</sup> Street and River Road, with an intake pipe extending into the Fraser River;
- Installation of control gates;
- Installation of 2.5 km of new culverts throughout alignment;
- Installation of 500 m of sierra walls throughout alignment;
- Widening/deepening for 16 km of existing ditches throughout alignment;
- Cleaning (or minimal/no change) for 7.5 km of existing ditches throughout alignment;
- Construction of 2.0 km of new ditches throughout alignment;
- Installation of irrigation utility and infrastructure (i.e., flood box, pump/lift stations, salinity controls, control gates and culverts/pipes);
- Re-vegetating riparian banks; and,
- Increasing the volume of water through existing ditches.

### 2.3 PROJECT SCHEDULE

The DIEP work is anticipated to commence in spring of 2010, with completion expected by mid 2012. Instream works will be conducted within the appropriate fisheries timing windows whenever feasible in order to minimize impacts to fish and fish habitat. In those cases where construction work is to be undertaken outside the applicable default timing windows, a qualified environmental professional (QEP) will develop appropriate mitigation measures to minimize potential impacts to fish and other aquatic species (e.g., amphibians).

## 2.4 EXISTING DRAINAGE/IRRIGATION CONDITIONS

The following is a summary of existing drainage and irrigation controls systems within the Delta irrigation network:

- 20 outfalls, of which only four have drainage functions and 16 have variable functions during the irrigation and drainage seasons:
  - Of the 20 outfalls, nine are flood boxes only, eight are combination of flood boxes and pump stations, and three are pump stations only.
  - Five of the outfalls also serve as irrigation water intakes (80th Street, MacDonald, Green Slough, Chillukthan Slough and Mason).
- Four internal pump stations, of which two are drainage pump stations and the other two are irrigation lift stations.
- 45 internal flow or water level controls, of which 13 are baffles (weirs) and the rest are either sluice gates, flap gates or canal gates (sluice gates combined with flap gates).

A detailed description of existing irrigation/drainage infrastructure within the Project area, as presented by each ditch segment, is provided in the following sections.

### 2.4.1 North Ditch

The existing 80<sup>th</sup> Street Ditch floodbox (Tasker Floodbox) outfall at the Fraser River consists of two 3.2 m wide by 1.52 m high rectangular boxes with swing gates at the outlet into the Fraser River. One of the swing gates is equipped with a 600 mm diameter sluice gate allowing gravity intake of water into the 80<sup>th</sup> Street Ditch. Water flow into the irrigation system is controlled by a baffle on the west side of a culvert beneath 80<sup>th</sup> Street and south of Progress Way (across from the Delta Community Animal Shelter). The crest elevation of the baffle is +0.37 m.

During the drainage season (winter/spring) and when tide elevations are lower than the water level in the 80<sup>th</sup> Street Ditch, the following conditions are in place to allow the 80<sup>th</sup> Street drainage ditches to flow through the flood boxes and into the Fraser River:

- The sluice gate is closed.
- The baffle across from the Delta Community Animal Shelter is removed.
- The swing gates are closed during high tide and opened during low tide periods

The conditions listed above are reversed during the irrigation season (summer/fall), to allow flow into the 80<sup>th</sup> Street Ditch through the sluice gate during rising tide, and into the irrigation system when the water level in the 80<sup>th</sup> Street Ditch is higher than the crest elevation of the baffle.

The existing Green Slough Control Gate consists of a pump station with four pumps, and a flood box with four 1.52 m wide by 1.52 m high rectangular boxes with swing gates on the outlet (Fraser River) side. Two of the swing gates are equipped with 600 mm diameter sluice gates allowing gravity intake of irrigation water into the Green Slough/South Crescent Slough system. Water flow into the irrigation system is controlled by a set of baffles on the inland side of the flood boxes. The crest elevation of the baffles is +0.36 m.

During drainage season water is discharged into the Fraser River through the existing Green Slough flood boxes or the pump station, and the following controls are in place:

- The pump station is set to drainage mode operation.
- The sluice gates are closed.
- The swing gates are closed during high tide and open during low tide.
- The baffles are removed.

During irrigation season when the tide elevation is higher than the crest elevation of the baffle and the salinity of the Fraser River water is acceptable for irrigation, water is allowed to flow into the Green Slough system through the sluice gates. The following conditions are in place during irrigation:

- The pump control elevations are set to irrigation mode operation, allowing higher water surface elevations in the inland system than during the drainage season.
- The sluice gates are open.
- The baffles are installed.

#### **2.4.2 South Ditch**

The South Ditch segment consists of an existing agricultural and rail ditch, following the BC Railway from Monastery Ditch to the 64<sup>th</sup> Street Ditch. Irrigation controls do not currently exist within the South Ditch segment.

#### **2.4.3 West Ditch**

The existing Chillukthan Slough Control Gate, located beyond the West Ditch at the Fraser River (**Figure 1**), consists of a pump station with three pumps and a flood box with six 1.6 m wide by 1.6 m high rectangular boxes with swing gates on the outlet (Fraser River) side. One of the swing gates is equipped with a 1,200 mm diameter sluice gate allowing gravity intake of water into the Chillukthan Slough system. The Chillukthan Slough intake is the primary source of water for the existing irrigation system. Water flow into the irrigation system is controlled by a set of baffles on the inland side of the flood boxes. The crest elevation of the baffles is -0.3 m.

During drainage season water is discharged into the Fraser River either through the existing Chillukthan Slough flood boxes or through the pump station and the following controls are in place:

- The pump station is set to drainage mode operation.
- The sluice gate is closed.
- The baffles are removed.

During irrigation season the reverse conditions are in place, as listed above. Water is allowed to flow into the Chillukthan Slough system through the sluice gate when the tide elevation is higher than the crest elevation of the baffles and the salinity of the Fraser River water is acceptable for irrigation.

The existing Mason Control Gate within Chillukthan Slough at Arthur Drive, south of Monastery Ditch, consists of a pump station with three pumps and a gravity outfall. This includes four 12.2 m long 600 mm diameter corrugated steel pipe culverts with flap gates on the outlet side and sluice gates on the inlet side.

During drainage season, the following conditions are in place at the Mason system to allow flow through the slough and into the Fraser River, either by way of the outlet culverts or the pump station:

- The pump station is set to drainage mode operation.
- The sluice gates are open.
- The flap gates are closed during high tide and open during low tide periods.

During irrigation season, water is allowed to flow into the Mason system through one of the outlet culverts when the tide elevation is higher than the water level in the Mason system and the salinity of the Fraser River water is acceptable for irrigation. The following conditions are in place at the Mason system during irrigation system:

- The pump station is set to irrigation mode operation, allowing higher water surface elevations in the inland system than during the drainage season.
- One of the four sluice gates is open.
- One of the four flap gates is open.
- Three of the four sluice gates are closed.

The existing 28<sup>th</sup> Street and 64<sup>th</sup> Street Lift Stations each consist of a single pump that operates only during the irrigation season. The 28<sup>th</sup> Street Lift Station supplies irrigation water to the southwest portion of Delta, while the 64<sup>th</sup> Street Lift Station supplies water to east Delta.

#### **2.4.4 East Ditch**

The existing Oliver Control Gate is located at the outlet of Big Slough into Boundary Bay, near the base of 112<sup>th</sup> Street, and consists of a pump station with three pumps and a flood box with six 1.52 m wide by 1.52 m high rectangular boxes with swing gates on the outlet (Boundary Bay) side. Water level in the irrigation system is maintained by a set of baffles on the inlet side of the flood boxes. The crest elevation of the baffles is -0.6 m.

During drainage season the following conditions are in place to direct water into Boundary Bay, either through the flood boxes or the pump station:

- The pump station is set to drainage mode operation.
- The baffles are removed.

During irrigation season the reverse conditions are in place allowing higher water surface elevations in the East Ditch system than during the drainage season.

#### **2.5 PROPOSED PROJECT WORKS**

Permanent infrastructure which will be installed for the DIEP primarily consists of water conveyance infrastructure, and will include:

- A screened pump at the Fraser River/80<sup>th</sup> Street intake with automated canal flap gates that can be raised during storm events;
- Lift stations at Highway 99 and 72<sup>nd</sup> Street, and 104<sup>th</sup> Street and Charlton Ditch;
- Automated water level control gates;
- Culverts to improve or maintain watercourse connectivity; and
- Sierra walls and fill materials to improve bank stability and to restore channel banks.

Temporary infrastructure, equipment, and materials associated with installation of the infrastructure described above may include:

- Storage and fuelling areas, site offices (trailers, etc).
- Construction equipment such as pumps, directional drill equipment, and excavators and trucks for removal and dispersal of excavated material.
- Bank stability and erosion control materials such as steel plates and coconut matting.

A summary of the proposed works with the DIEP Project area includes the following:

- Modifying the operation of five existing outfalls (80<sup>th</sup> Street, Green Slough, Chillukthan Slough, Mason and Oliver outfalls);
- Limiting the operation of one existing internal irrigation lift station (64<sup>th</sup> Street);

- Installing two internal irrigation lift stations (Highway 99 and 104<sup>th</sup> Street);
- Installing five automatic water level control gates (North, Monastery Control Gate, South, East and Big Slough Control Gates), which are weirs with moveable crest elevation, similar to the existing Langemann Gate close to McKee Pump Station;
- Installing three semi-automatic flow control gates (Mason, Centre Ditch at 104<sup>th</sup> Street and Charlton Ditch); and
- Installing automatic or manually operated control structures (flap gates or canal gates) on minor ditches.

A detailed description of the proposed works listed above, are presented below for each DIEP Ditch Segment.

### **2.5.1 North Ditch**

#### **80<sup>th</sup> Street Outlet/Inlet**

The proposed changes to structures at the 80<sup>th</sup> Street and River Road flood box include:

- The installation of an intake pipe within the Fraser River and a reversible pump station, located near River Road.
- Improvements to the anti-salinity controls at the 80<sup>th</sup> Street intake.
- The addition of two canal gates (sluice gates with flap gates) on the inlet side of the flood boxes.
- The addition of opening mechanisms to the swing gates to keep them open during the irrigation season.
- The removal of the 80<sup>th</sup> Street baffle, located south of Progress Way across from the Delta Community Animal Shelter.

To allow water to be discharged into the Fraser River during the drainage season (winter/spring), water will be directed through the existing flood boxes or through the pump station during drainage mode, with canal gates open and swing gates closed during high tide and open during low tide. During the irrigation season (summer/fall), these conditions will be reversed so that the pump station is set to irrigation mode (pumping water from the Fraser River into the irrigation system), and the canal gates are closed and swing gates open.

Water will be allowed to flow from the Fraser River into the irrigation system through the flood boxes during high tides and through the pump station during low tides. Approximately one third of the total water intake will be by gravity through the flood boxes.

### **Wilson Avenue/Brown Street Canal Relocation**

Further upstream of the 80<sup>th</sup> Street ditch, an approximately 550 m long section of the ditch (Wilson Avenue/Brown Street Canal) located on the west side of 76<sup>th</sup> Street is proposed to be relocated to the east side of 76<sup>th</sup> Street. Consultation with Terasen Gas has revealed that the proposed irrigation channel dimensions are likely too wide to accommodate the originally proposed new gas line alignment which was proposed to be located on the east side of the widened ditch (i.e., between the ditch and the SFPR alignment). Instead of widening this existing ditch section, ditch relocation further to the east (i.e., between the new gas line and the SFPR alignment) is now considered to be a favoured alternative. The new gas line corridor would provide a physical separation between adjacent industrial lands and the new ditch section, while also providing an opportunity for a riparian restoration area along the east side of the new ditch (likely be 5 to 7 m in width). This will also provide an opportunity for a dual access trail on the west side of the ditch, between the relocated gas line and the relocated ditch.

#### **North Control Gate:**

A control gate (North Control Gate) will be constructed at 72<sup>nd</sup> Street and McAllister Road, further upstream of the proposed 76<sup>th</sup> Street Ditch relocation works.

#### **Green Slough Control Gate:**

The proposed changes to the structures at the Green Slough Control Gate include replacing the baffle on one of the four flood boxes with a canal gate (sluice gate with flap gate), and the addition of an opening mechanism to the swing gate on the two flood box with the new canal gate.

During drainage season the following conditions will be in place to direct water into the Fraser River through the existing Green Slough flood boxes or the pump station:

- The pump station is set to drainage mode operation (discharge water into the Fraser River).
- The canal gate is open.
- The swing gates are closed during high tide and open during low tide periods.
- The baffles are removed.

During irrigation season when the tide elevation is higher than the water level in Green Slough and the salinity of the Fraser River water is acceptable for irrigation, water will be allowed to flow into the Green Slough system through the open swing gate and the canal gate. The following controls will be in place during irrigation mode:

- The pump station will be set to irrigation mode operation, allowing higher water surface elevations in the inland system than during the drainage season.
- The canal gate will be closed.
- The swing gate on the flood box with canal gate will be open.

- The swing gates on the flood boxes without canal gates will be closed during high tide and open during low tide periods.
- The baffles on the food boxes without canal gates will be installed.

#### **Highway 99 Lift Station:**

A lift station is proposed at Highway 99, which will receive water from the 80<sup>th</sup> Street intake and provide water supply to East and Southwest Delta. This would be a new connection between the south portions of Crescent Slough and the south 72<sup>nd</sup> Street areas that includes an about 800 m long 1,500 mm diameter closed conduit through the proposed SFPR/Highway 99 Interchange.

#### **Airport Control Gate:**

An automated control gate is proposed at 72<sup>nd</sup> Street and Monastery Ditch (Airport Control Gate) connecting primary channels in the South and West Ditch segments.

#### **2.5.2 South Ditch**

A control gate (South Control Gate) is proposed along the BC Rail Ditch, south of Monastery Ditch, which will connect the primary irrigation channel to secondary networks along 64<sup>th</sup> Street.

#### **2.5.3 West Ditch**

#### **Monastery Control Gate:**

A control gate (Monastery Control Gate) is proposed along Monastery Ditch to the east of 64<sup>th</sup> Street, which will connect the primary irrigation channel to the West Ditch primary and secondary ditch networks

#### **Mason Control Gate**

The proposed changes to Mason Control Gate within Chillukthan Slough at Arthur Drive include installing automated controls and removing all four culverts during the irrigation season. During drainage season, operation will be the same as existing, and during irrigation season, all four culverts will be closed.

#### **Chillukthan Slough Control Gate:**

The proposed changes to the Chillukthan Slough Control Gate include replacing the baffle on one of the six flood boxes with a canal gate (sluice gate with flap gate) and installing an opening mechanism to the swing gate on the two flood box with the new canal gate. During drainage season the following conditions will be in place to direct water into the Fraser River either through the existing flood boxes or the pump station:

- The pump station will be set to drainage mode operation (discharge water into the Fraser River).
- The canal gate will be open.
- The swing gates will be closed during high tide and open during low tide periods.



- The baffles will be removed.

During the irrigation season, water will be allowed to flow into the Chillukthan Slough system through the open swing and the canal gate when the tide elevation is higher than the water level in Chillukthan Slough and the salinity of the Fraser River water is acceptable for irrigation. The following conditions will be in place during irrigation operations:

- The pump station will be set to irrigation mode operation, allowing higher water surface elevations in the inland system than during the drainage season.
- The canal gate will be closed.
- The swing gate on the flood box with canal gate will be open.
- The swing gates on the flood boxes without canal gates will be closed during high tide and open during low tide periods.
- Baffles on the flood boxes without canal gates are installed.

#### **28<sup>th</sup> Avenue and 64<sup>th</sup> Street Lift Stations:**

There are no proposed changes to the existing operation of the 28<sup>th</sup> Avenue Lift Station, and no provisions for accommodating fish access through the lift station.

The proposed operation of the 64<sup>th</sup> Street Lift Station will be limited to early spring when the irrigation system is filled prior to the irrigation season if needed, or may be taken out of commission.

#### **2.5.4 East Ditch**

The East Ditch segment is considered the primary irrigation channel along the Centre Ditch to Big Slough, with secondary network channels north of Big Slough (**Figure 1**). Control gates are proposed to be installed at 80<sup>th</sup> Street and Churchill Street (East Control Gate), at Centre Ditch and 104<sup>th</sup> Street, at Charlton Ditch and 104<sup>th</sup> Street, and at Big Slough south of Ladner Trunk Road.

##### **Centre Ditch Control Gate:**

The Centre Ditch Control Gate at 104<sup>th</sup> Street will be an irrigation flow control device required in association with drainage improvements between Centre Ditch and the Oliver Pump Station. These drainage improvements will require the installation of a large (2 by 1,800 mm diameter) culvert at this location that allows flow in an easterly direction only via installation of a flap gate on the east side of the culvert. To limit irrigation flows into this ditch system, a partially open sluice gate is envisioned at this location.

### **Charlton Ditch Control Gate:**

The Charlton Ditch Control Gate at 104<sup>th</sup> Street will be an irrigation flow control device required in association with the installation of the 104<sup>th</sup> Street Lift Station. The purpose of the device will be to limit eastward irrigation flows along Charlton Ditch and maintain water levels in the West 104<sup>th</sup> Street Ditch upstream of the lift station. To limit irrigation flows, a partially open sluice gate on the existing 1,950 mm diameter culvert is envisioned at this location.

### **Charlton Ditch and 104<sup>th</sup> Street Lift Station:**

A lift station is also proposed at the Charlton Ditch and 104<sup>th</sup> Street, which will direct water from the Centre Ditch system and supply irrigation water to areas east of 104<sup>th</sup> Street through the 104<sup>th</sup> Street Ditch, Weaver Ditch, Robertson Slough and Lorne Ditch system. Typical irrigation water levels are -0.50 m on the receiving (south) and +0.05 m on the discharge (north) side of the lift station. This lift station will primarily operate during the irrigation system, with some potential operation during the drainage season.

### **Big Slough Control Gate:**

The Big Slough Control Gate is proposed to maintain water level in the Weaver Ditch and Robertson Slough system while allowing lower water levels in Big Slough during the irrigation season. It will allow the quick release of water during summer storms preventing flooding of lower lying areas. The gate will be an automated water level control, such as a Langemann Gate, which maintains water level at about +0.05 m in the Weaver Ditch/Robertson Slough system. The gate may be located at the Weaver Ditch/Robertson Slough/Big Slough confluence, or preferably at the BC Rail crossing over Big Slough where there are existing structures in the slough. The separation between the water levels on the two sides of the gate is about 0.6 m.

### **Oliver Control Gate:**

The proposed changes to the Oliver Control Gate will include replacing the baffle on one of the six flood boxes with a canal gate (sluice gate with flap gate). During the drainage season, water flow will be directed into Boundary Bay either through the flood boxes or the pump station (as the existing operation), with the following conditions in place:

- The pump station will be set to drainage mode operation.
- The sluice gate will be open.
- The swing gates will be closed during high tide and open during low tide periods.
- The baffles will be removed.

During irrigation season the reverse conditions will be in place, with the exception of the swing gates which will be closed during high tide and open during low tide periods.

It is our understanding that CoD is proposing to install an additional “fish friendly” pumpstation and ancillary infrastructure works adjacent to the existing Oliver Pumpstation to supplement water movement capacity from Big Slough into Boundary Bay during high tide periods. The new pumpstation will consist of four slowly rotating auger (screw-like) units, which will be the primary method for conveying water during regular flow events. The existing pumpstation will be engaged during higher flows.

## **2.6 PROJECT OPERATION**

During the operations phase of the Project, it is anticipated that the CoD will be responsible for ongoing maintenance to the ditches and associated vegetation on an as-needed basis. Maintenance may include: ditch maintenance (mowing or brushing of riparian habitat and restoration of bank stability), replacement of culverts or pipes, and repairs and/or replacement of the pump station, lift stations or control gates. These infrastructure components are intended to be permanent and are not expected to require substantial or frequent maintenance.

The DIEP area is planned to operate in the long-term and a decommissioning date has not been identified. In the event of decommissioning, federal and provincial requirements for site abandonment would apply.

### **3.0 CONSULTATION**

#### **3.1 CONSULTATION TO DATE**

The DIEP was developed during the SFPR approval process in consultation with the local agricultural community, regulatory agencies and stakeholders. This consultation has included dialogue with:

- Department of Fisheries and Oceans Canada (DFO), to inform of potential impacts to fish habitat
  - initial Project Description provided on November 18, 2009;
  - meeting on November 20, 2009;
  - description of potential advance works, submitted February 22, 2009; and
  - Revised Project Description submitted on February 26, 2010.
- Ministry of Agriculture and Lands (MAL), due to the linkages with the agriculture sector;
- CoD, given to the location of the Project;
- Delta farmers and the Delta Farmers Institute (DFI);
- The SFPR Inter-Agency Environmental Review Committee; which includes Transport Canada, Environment Canada, Metro-Vancouver, and the Ministry of Environment;
- First Nations:
  - The DIEP was first presented to First Nations as part of the SFPR Inter-Agency Environmental Review Committee;
  - The Project Definition Report was sent to: Musqueam Indian Band; Tsawwassen First Nation; Katzie First Nation; Kwantlen First Nation; and the Kwikwetlem First Nations on February 23rd 2010;
  - Communication with First Nations with respect to the DIEP has occurred in person, via email and by telephone; and
  - An in-person meeting with the Musqueam First Nation on March 2, 2010.

##### **3.1.1 Government**

###### **3.1.1.1 Provincial**

Given the DIEP's focus on the agriculture sector, consultation with provincial agencies has included consultation with the MAL on an ongoing basis throughout the design phase of the Project.

In addition, MoT has consulted with MoE on an ongoing basis through bi-weekly meetings established to support environmental permitting for SFPR construction, during the development of the conceptual design for the DIEP, in order to identify provincial environmental permitting requirements of various design options.

### **3.1.1.2 Federal**

In accordance with the Federal Coordination Regulations established under CEAA, MoT is required to distribute a description of the proposed works to federal departments requiring the assessment to:

- Determine if other departments may have a responsibility under Section 5 (1) of CEAA;
- Obtain specialized advice, pursuant to Section 12 (3) of CEAA, on the environmental assessment of the proposed Project.

In order to fulfil this requirement, a Project Description has been submitted to DFO (including an initial project description provided on November 18, 2009 and a revised version forwarded on February 26, 2010). Provision of the Project Description will facilitate consultation with federal agencies with a potential interest in the Project that have not been consulted through existing consultative mechanisms.

### **3.1.1.3 Local**

Significant consultation has been undertaken with local governments including the CoD and Metro Vancouver. The CoD was consulted with given its role in managing the existing and future drainage infrastructure, the importance of agriculture to the local economy and the CoDs role in the management of the Burns Bog Ecological Conservancy Area (BBECA). Metro Vancouver, as the lead agency responsible for managing the BBECA has also been consulted on an ongoing basis to ensure the proposed Project does not conflict with long term management objectives for this protected area.

## **3.1.2 First Nations**

As part of the SFPR Environmental Assessment, MoT conducted a specific and directed First Nations Consultation Program to ensure First Nations, with a potential interest in the Project, were kept informed and effectively engaged in the environmental assessment process. Objectives of the Program were to consult on, identify and mitigate potential Aboriginal interests potentially impacted by the Project. MoT continues to work closely with participating First Nations to ensure these objectives are met and that First Nations are kept informed of Project-related information.

Consultation for the purposes of the DIEP involves the following First Nations who participated in the review component of the environmental assessment for the SFPR project: Musqueam Indian Band; Tsawwassen First Nation; Katzie First Nation; Kwantlen First Nation; and the Kwikwetlem First Nation.

The DIEP was first presented to First Nations as part of the SFPR Inter-Agency Environmental Review Committee. The SFPR Inter-Agency Environmental Review Committee was formed as part of the agreed upon commitments of the approval of the SFPR project. The construction of the DIEP was also an agreed upon commitment of the SFPR project, thus, consultation under this direction was appropriate. The Project Definition Report was sent to First Nations on February 23rd 2010 with a request for review

and an offer to meet to discuss any concerns or questions. To date, the Musqueam Indian Band has provided comments and requested a meeting to discuss the Project. A meeting between the DIEP team and Musqueam Indian Band representatives occurred on March 8th 2010. The meeting focused on an overview of the DIEP and addressed Musqueam Indian Band representatives' questions regarding fisheries and opportunities for involvement in fisheries-related activities associated with the Project. At this time, no other comments have been received from First Nations.

MoT is committed to ensuring First Nations are kept informed of Project activities and to working with First Nations to address any concerns or questions associated with the Project throughout the design, construction and operation phases of the DIEP.

### **3.1.3 Stakeholders/Public**

Consultation with key stakeholders including adjacent landowners, and agricultural interests has been ongoing during the development of the DIEP concept. As the DIEP is required under the terms of the ALC approval for construction of the SFPR project, information on the Project has been made available to all stakeholders as well as the general public through previous permitting and approval processes. A group of stakeholders with an interest in the Project include the membership of the Delta Farmers Institute (DFI) who have been involved in the development of the DIEP concept during the EA process for SFPR as well as the current proposed design.

### **3.2 FUTURE CONSULTATION**

Following submission of this Environmental Assessment Screening report, consultation with the relevant government agencies, it is expected that additional meetings with government agencies, First Nations, affected landowners, and key stakeholders will continue throughout future stages of design and the of the Project, in order to address any concerns or questions that may arise. First Nations will be provided an opportunity to review and comment on the DIEP Screening Report and any relevant reports to further share Project-related information. As a result of discussions with the Musqueam Indian Band's Fisheries Department, a DIEP site visit will be offered to First Nations in April 2010. The Project tour will include the following sites: DIEP North Ditch at the Fraser River/80th Street, including Tilbury Slough; DIEP East Ditch from 104th Street south to Ladner Trunk Road; Designated cultural/heritage sites - Nottingham Farm Site DgRs-56; and automated and flap gates at Green, Crescent and Chillukthan Sloughs.

## 4.0 METHODOLOGY

### 4.1 STUDY AREA

The spatial extent of this environmental assessment includes the ditches/watercourses within the 28 km DIEP alignment and land/riparian vegetation within 15 m on either side of existing or proposed drainage ditches. A 15 m riparian habitat study area boundary was chosen based on the existing conditions of the site; the average width of existing riparian habitat along the DIEP alignment is less than 10 m, due to extensive historic disturbance. Moreover, any direct impacts of the DIEP on riparian habitats are not expected to exceed 15 m to either side of alignment watercourses.

The scope of this assessment does not include those areas that are directly adjacent to the SFPR project, are dependent on the design of SFPR, and/or have been integrated into SFPR project works already advanced (**Figure 1**). Potential impacts associated with the development of the DIEP in these areas fall within the SFPR corridor and have been considered and assessed as part of the EA review of the SFPR project. The SFPR project was subject to review under the *BC Environmental Assessment Act* (BCEAA) and the CEAA and received provincial approval in June 27, 2008 and federal approval on July 29, 2008. The Owner's Table of Commitments and Assurances (TOCA) is attached in **Appendix A**, and provides mitigation to address potential effects to biophysical and socio-community values associated with the construction of SFPR (including physical works associated with the DIEP that occur within the SFPR corridor).

### 4.2 DESKTOP ASSESSMENT

The following resources were consulted to investigate the existing conditions of the site, and determine the valued ecosystem components for the assessment and to determine the potential impacts on the environmental as a result of the proposed Project:

- Aerial photographs;
- CoD Delta Watersheds Fish and Amphibian Distributions map;
- BC Conservation Data Centre (CDC);
- BC Ecosystems Explorer Red-and Blue-Lists;
- BC Ministry of Tourism, Culture, and the Arts, Archaeology Branch;
- BC Natural Resource Information Centre habitat sensitivity maps;
- Canadian Wildlife Service (CWS)/Environment Canada Schedule 1 Species at Risk Registry;
- DFO online MAPSTER and Habitat Wizard;
- BC Ministry of Environment (MoE) Fisheries Information Summary System (FISS); and
- Fraser River Estuary Management Program (FREMP) Atlas.

### 4.3 FIELD ASSESSMENT

Hemmera completed a field survey on February 23<sup>rd</sup>, 2010 for this screening report, in addition to site assessment work on November 2<sup>nd</sup> and 4<sup>th</sup>, 2009 in support of planning for the DIEP in association with a strategic environmental assessment for this Project. Given the nature of the Project, fish and fish habitat were the primary focus of these site visits including assessments of ditches/watercourses and associated riparian vegetation within the DIEP alignment. Wildlife habitat within the riparian areas of the DIEP alignment was assessed, focusing on potential value to sensitive wildlife or species at risk known or potentially occupying the riparian habitat associated with the watercourses included in the DIEP. Hemmera also conducted a preliminary Pacific water shrew habitat suitability assessment along the DIEP alignment on February 5, 2010.

In addition to the field studies conducted for the DIEP are the extensive field studies already undertaken in association with the SFPR project. This work includes the collection of baseline data associated with the SFPR environmental assessment (Hemmera 2006) and ongoing environmental monitoring work, and the results from these studies have been considered in this assessment.

The species observed during the February 23<sup>rd</sup>, 2010 site visit included:

- Three Great Blue Heron (*Ardea herodias fannini*) observed perching and foraging in or around watercourses within the Project area; and
- Multiple Bald eagles (*Haliaeetus leucocephalus*) observed during perching, resting, and flying in trees around the Boundary Bay airport, and nests were observed in the trees.
- American robin (*Turdus migratorius*) observed flying and perching in and around deciduous trees.

These species are considered widely abundant in southwest Delta, and are commonly observed year-round in and surrounding, the Project area.

### 4.4 SELECTION OF VECs AND VSCs

Based on the scope of the proposed Project works, the study area boundary, and the results of the field and desktop assessments for potential project-ecological interactions, the following were chosen as Valued Ecosystem Components for the assessment of potential Project-related environmental effects:

- Surface Water Quality
- Groundwater Quality
- Soils and Terrain
- Air Quality
- Fish and Fish Habitat
- Vegetation and Wildlife



The following Valued Social Components were chosen for the assessment of potential Project-related effects (and are discussed in **Section 6.0** following the discussion on VECs):

- Land use
- Navigable Waters
- Archaeology
- Noise

The potential impacts and recommended mitigation for the selected VECs and VSCs is provided in **Section 7.0**; following the discussions on existing site conditions for each VEC and VSC (**Sections 5.0 and 6.0**, respectively).

## 5.0 VALUED ECOSYSTEM COMPONENTS

### 5.1 WATER QUALITY

The Project is located within the Fraser River watershed. Ditches within the DIEP area drain surface water from agricultural properties and, to a lesser extent, industrial areas and transportation infrastructure surfaces. Tidally influenced drainage ditches exist in both the north and south segments of the DIEP alignment. In the North Ditch segment where the Fraser River flows past 80<sup>th</sup> Street on its southern bank, the 80<sup>th</sup> Street Ditch is connected to the mainstem. At the intersection of 112<sup>th</sup> Street and Irwin Road, the Project alignment is adjacent to Boundary Bay and crosses Big Slough, before connecting with Centre Slough (Centre Ditch/Charlton Ditch). Agricultural ditches within the Project area are tidally influenced from the south at Boundary Bay, from the Fraser River to the west, and ditches in the eastern portion of the alignment drain southwest from Big Slough.

Travelling south, the ditches associated with Crescent Slough, Chillukthan Slough, and Monastery Ditch ranged from 3-10 m wide and are within 5 m from the road or agricultural properties. Centre Slough has an average width of approximately 9 m, and is within 5 m of roadways and/or agricultural lands for its length (**photo 18**). The eastern portion of the alignment, Big Slough, has an average width of approximately 7 m, and crosses Ladner Trunk Road (**photos 12-15**). During site visit work, evidence of erosion and sloughing of the bank was observed, along with extensive mats of reed canary grass indicating seasonal influence of water levels.

The DIEP watercourses are currently impacted by agricultural and industrial runoff, are channelized, and generally contain a substrate of fine sediment, and typically have low levels of dissolved oxygen (Hemmera 2006). In addition to fine sediment, these watercourses are highly turbid following rain events, and algal growth in the summer is common (*Pers. Obs.* Hemmera Field staff 2008 - 2010). The majority of the watercourses in the study area have poor water quality and are subject to impacts such as introduction of nitrates and other fertilizers/pesticides, runoff from roadways, and other urban substances from surrounding land use.

### 5.2 SOILS AND TERRAIN

Soils within the study area consist of marine deposits composed predominately of poorly graded gravels, sands and silt/sand mixtures. These deposits have resulted in poor drainage and a high water table within the soil classification of Orthic Humic Gleysol (saline phase) (Summit 2006). This soil type is considered to occupy over 6,000 hectares in the Delta lowlands. The resulting soil limitations include poor drainage and saline sands within the lower elevations of the soils.

The terrain in the Project area is predominantly flat with gentle slopes (some wider ditch embankments have steep slopes), dominated by grasses and invasive vegetation. Agricultural lands along the DIEP alignment are generally less than 10 m above sea level and high or perched groundwater tables are common as a result of various combinations of high precipitation, high tides, and freshet (spring runoff) conditions in the Fraser River.

### 5.3 AIR QUALITY

The major sources of emissions originate from light-duty passenger cars, heavy-duty trucks and farm equipment using Highway 99, Highway 10, Highway 17 and their associated road networks and railway operations. Marine vessels contribute to air emissions in the study area, though at a lesser extent than vehicles.

A Regional Air Quality Impact Assessment conducted in September, 2006 along the proposed SFPR project alignment was conducted within a 100 km radius from the centre of the SFPR alignment, thus encompassing the DIEP area. The results were derived from data from the revised Greater Vancouver Regional District/Fraser Valley Regional District (GVRD/FVRD) 2000 emission inventory and monitored Common Air Contaminants (CAC) including: PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>x</sub>, SO<sub>x</sub>, VOC, CO, NH<sub>3</sub>. The results demonstrated that the regional traffic-related emissions of CAC are currently within acceptable limits, including forecasted future projects proposed for the study area/regional area potentially contributing to emissions (RWDI 2006).

### 5.4 FISH AND FISH HABITAT

The majority of the proposed DIEP will be directed through existing drainage ditches classified as green- or yellow-coded<sup>1</sup>, and characterized as having poor water quality and limited connectivity (perched culverts during low flows/tides, top-mounted flapgates and other existing drainage/irrigation infrastructure), and limited riparian cover. These ditches are generally channelized, low-gradient road-side features with little overhanging cover, fine sediment substrates, and lacking in complex pools or riffles. Documented resident fish species present within the DIEP alignment ditches include threespine stickleback, brassy minnow, redbelly darter and peamouth chub. Non-native, invasive fish species such as goldfish, pumpkinseed and common carp have also been documented in these drainage ditches (Hemmera 2006). High value salmonid habitat (FREMP red-coded water feature) exists at the proposed intake location north of River Road, near the confluence of Tilbury Slough and the Fraser River (DIEP North Ditch segment), and at the eastern extent of the DIEP near Oliver Slough at Boundary Bay (DIEP East Ditch segment). These areas support salmonid migration/rearing habitat, and the proposed North

<sup>1</sup> SFPR watercourse coding, which is also being applied to DIEP, is based on CoD and City of Surrey watercourse classification, and is defined as follows:

- Red = inhabited or potentially inhabited by salmonids year round
- Dashed-red = inhabited primarily by overwintering salmonids or potentially inhabited seasonally with access enhancement
- Yellow = Significant food/nutrient value; resident fish (no salmonids) present
- Green = Insignificant food/nutrient value; no fish present

Ditch intake is associated with the Fraser River mainstem which provides habitat for the BC Red-listed White Sturgeon, *Acipenser transmontanus*, Lower Fraser River population.

With the exception of high value fish habitat at the DIEP inlet/outlet locations to the Fraser River and Boundary Bay, as described above, and majority of the East Ditch segment, the remaining watercourses within the DIEP are considered poor fish habitat based on water withdrawal, riparian habitat loss, channelization and dyking, and water quality degradation.

Fish habitat values, connectivity, and documented fish presence within each of the DIEP ditch segments are discussed below.

### **North Ditch**

#### **Fraser River Intake:**

The upstream portions of the North Ditch segment are dominated by resident fish (i.e., threespine stickleback, peamouth chub and redbelly shiner (Hemmera 2006; FISS 2006; 2009; 2010)). The provincially Red-listed white sturgeon (*Acipenser transmontanus*), Lower Fraser River population, has been recorded in the Fraser River mainstem near the proposed intake north of River Road (i.e., near the confluence of Tilbury Slough and the Fraser River, in DIEP North Ditch segment). This portion of the Fraser River also supports salmonid migration/rearing habitat, along with habitat for white sturgeon. Riparian vegetation in portions of the North Ditch near Burns Bog is greater than 30 m in width and consists of mature deciduous trees and wetland vegetation, although the majority of riparian vegetation in the North Ditch segment is narrow and inhabited by invasive species.

Fish entry from the Fraser River into the 80<sup>th</sup> Street Ditch is currently feasible through the swing gates during receding tide and through the sluice gate during rising tide. Fish entry to the connected ditch system is feasible when the water level in the 80<sup>th</sup> Street Ditch is higher than the crest elevation of the baffle.

#### **80<sup>th</sup> Street Ditch:**

Moderate value salmonid habitat exists south of River Road, along the 80<sup>th</sup> Street ditch to Progress Way (**photos 1 and 2**). This roadside ditch travels through an industrial area, and the riparian habitat consists mostly of manicured grass on either side. A catchment culvert located at 80<sup>th</sup> Street south of Progress Way currently restricts stream connectivity during low flow and/or low tide events, and is considered to limit the upstream potential for salmonid presence. South and east of this culvert, the North Ditch segment passes through the Burns Bog transition forest, and enters the 80<sup>th</sup> Street Stormwater Retention Area, located near Cranwest Farms in the Tilbury industrial park. Riparian vegetation in this area is higher value, consisting of mature bog forest ranging from 15 to 30 m in width for most of its length. This high value habitat area is limited due to poor downstream connectivity downstream. Re-

connection/hydraulic restoration in this area is currently underway as part of the SFPR project, and will result in the North Ditch connecting south, via Crescent Slough.

#### **Crescent Slough:**

Crescent Slough drains north and south from 60<sup>th</sup> Avenue, and has been channelized and impacted by surrounding agricultural land use activities (Hemmera 2006). The most recent documented presence of salmonids in Crescent Slough was a 1983 cutthroat trout record (FISS search 2010). Other fish presence in the slough currently include black crappie, brassy minnow, carp, goldfish, peamouth chub, prickly sculpin, and threespine stickleback. Downstream reaches of Crescent Slough may provide some short-term rearing habitat values for out-migrating non-natal chinook fry during their April-June descent to marine waters, and coho fry and juveniles may also utilize downstream portions of the slough during their freshwater life stage (LGL Limited 2009), but recent salmonid use in this area has not been recorded.

Juvenile chinook access in eastern Crescent Slough is frequently blocked from mid-May to October, and out-migration opportunities are limited (during this time the pumping station is in irrigation mode and stop logs are inserted into the floodbox culvert); restricting out-migration opportunities to times when the flap gates are open (LGL Limited 2009).

#### **Green Slough:**

The western extent of Crescent Slough at the Green Slough Control Gate (highlighted as purple on **Figure 1**), has floodboxes which are frequently open and for greater periods. Fish access from the Fraser River through floodbox sluice gates is considered feasible when both the tide elevation and water level in Green Slough are above the crest of the baffles. Although fish access opportunities into this portion of the slough may be greater compared to the other portions of Crescent Slough, juvenile salmonid access is not available year-round (LGL Limited 2009).

The southern portion of Crescent Slough passes through a lift station and an 818 m long culvert underneath Highway 99, which forms a connectivity barrier to upstream areas. To the south of Highway 99, the North Ditch passes through agricultural drainage and 72<sup>nd</sup> Street roadside ditches, which have narrow riparian vegetation (averaging approximately 5-10 m in width).

#### **South Ditch**

The South Ditch segment is adjacent to agricultural areas, following the BC Railway from Monastery Ditch to the 64<sup>th</sup> Street Ditch. This segment is channelized and the riparian vegetation generally consists of maintained grass on the east bank and a 7-15 m width of reed canary grass, Himalayan blackberry, and scattered deciduous trees and shrubs on the west bank. Fish species presence are not recorded for this ditch segment (FISS search 2010); however, based on connectivity to the North Ditch and West Ditch, peamouth chub and threespine stickleback may be present in the South Ditch streams.

## **West Ditch**

### **Monastery Ditch:**

The West Ditch segment follows Monastery Ditch west from Airport Ditch to Chillukthan Slough and south to Deltaport Way east of 46A Street (**photos 8 -11**). Monastery Ditch is aligned through agricultural land, and is channelized with limited (4 – 10 m in width) riparian vegetation consisting primarily of reed canary grass and Himalayan blackberry. Along portions of the Monastery Ditch between 72<sup>nd</sup> Street and the BC Rail tracks, the riparian vegetated is maintained and not considered functioning fish habitat. Documented fish species include threespine stickleback, brassy minnow and redbelly shiner (Hemmera 2006; FISS search 2010).

### **Chillukthan Slough:**

Chillukthan Slough travels south and east, is bordered by agricultural and residential properties, and contains a narrow strip (5 – 10 m width) of mature deciduous trees on both sides, providing shade and overhanging cover. Fish species documented in the slough include coho, peamouth chub and threespine stickleback (Hemmera 2006; FISS search 2010). The slough may be used as rearing or overwintering habitat for coho, and as early spring rearing habitat for chinook fry, however, spawning habitat is considered poor because of the presence of fine sediment in the water column. Juvenile salmonid access in Chillukthan Slough is consistent until mid-May, after which access into the slough is considered very limited, and out-migrating juveniles after mid-May would have to pass through the pumps during the summer irrigation period (LGL Limited 2009).

Fish entry from the Fraser River is considered feasible through the Chillukthan Slough sluice gate when both the tide elevation and water level in the slough are above the crest of the baffles. Fish access further up the slough past the Mason Control Gate system (**Figure 1**) is considered limited based on the flap gates and length of small diameter culverts present.

## **East Ditch**

Watercourses within the East Ditch segment range from 3 – 10 m in width, and have fine sediment substrates. Resident fish in the DIEP East Ditch segment include brassy minnow and threespine stickleback. Patches of mature deciduous forest ranging from 7–30 m in width occur over approximately 25% of the East Ditch alignment, although are only present on one side of the bank, limiting the amount of shade and cover provided.

### **Centre Slough:**

From the west, a flapgate and pumphouse are located immediately before Centre Slough connects to Airport Ditch, west of 72<sup>nd</sup> Street (**photos 21a and 21b**). Centre Slough is well connected downstream up to 80<sup>th</sup> Street, where a concrete top-mounted flap gate (East Control Gate) provides a barrier to fish passage (**Photo 22**). Centre Slough continues east to 104<sup>th</sup> Street Ditch, connects with Big Slough

(**photos 17 and 18**), and continues approximately 700 m north of Ladner Trunk Road. Riparian vegetation along both Centre Slough and Big Slough dominated by reed canary grass, hardhack and Himalayan blackberry, and is maintained on the roadside banks of the ditch (Hemmera field staff observations, 2010). Based on existing riparian habitat values and connectivity between Big Slough and the flap gate at 80<sup>th</sup> Street, the portion of Centre Slough upstream from its confluence with Big Slough is considered a red-coded.

It is our understanding that Centre Slough near 72<sup>nd</sup> Street was widened in 2007, and the works included riparian re-vegetation, as part of a fish habitat compensation program for ditches lost south of Churchill Road during expansion of the Boundary Bay Airport. The compensation works included the construction of a large drainage ditch, and planting of native vegetation within an area approximately 50 m long and 9 m wide. This work was conducted by others in accordance with DFO and reportedly had a low (approximately 3%) success rate (MoT; *pers. comm.*).

#### **Big Slough:**

Centre Slough is well connected to Big Slough, via 104<sup>th</sup> Street Ditch (**photos 17 – 20**). Big Slough is a red-coded water feature, supporting salmonid migration, rearing, and spawning habitat (**photos 12-15**). Big Slough drains southwest through the Oliver Control Gate into Boundary Bay, and supports chinook salmon, coho salmon, coastal cutthroat trout, sculpin, threespine stickleback, and peamouth chub (FISS 2010).

The out-migration of fish from Big Slough into Boundary Bay is currently limited to when the Oliver Control Gate flood boxes are open at the low end of the tide cycle during the drainage season. The installation of the proposed CoD “fish-friendly” pumpstation at this control gate will allow for out-migration of juvenile and small bodied fish into Boundary Bay during the high portion of the tide cycle.

## 5.5 VEGETATION AND WILDLIFE

### 5.5.1 Vegetation

The DIEP is located within the Coastal Douglas-fir Moist Maritime (CDFmm) biogeoclimatic zone (Green and Klinka 1994), and is generally directed beside or within existing linear infrastructure (SFPR, rail, roadways, drainage ditches). Most of the available wildlife habitat in the study area is within previously disturbed areas where existing vegetation is constrained and/or maintained to a narrow strip, and dominated by invasive plant species. Aside from limited portions of sensitive habitat and natural vegetation located near the North Ditch segment, the remainder of vegetation along the alignment has been highly modified through historical and existing land use. Along the majority of the DIEP alignment, riparian vegetation consists of grass and shrubs, with isolated areas of deciduous trees. Dominant species include invasives such as Himalayan blackberry and reed canary grass, shrubs, and sparse deciduous trees. Riparian widths are limited due to agricultural and roadside land use, and vegetation is regularly modified through maintenance clearing activities, ranging from 5 - 15 m in width (**photo 1**). Common vegetation within the majority of the ditches within the DIEP alignment consists of native and non-native vegetation, such as:

- Himalayan blackberry (*Rubus discolor*);
- Grasses (*Poaceae spp.*);
- Hardhack (*Spiraea douglasii spp.douglasii*);
- Scotchbroom (*Cytisus scoparius*);
- Black cottonwood (*Populus trichocarpa*);
- Common rush (*Juncus effusus*);
- Sword fern (*Polystichum munitum*); and
- Common horsetail (*Equisetum arvense*).

In addition to these common species, several plant species at-risk have the potential to occur in the study area (**Table 4**).



**Table 4: Plant Species at Risk Potentially Occurring in the Study Area**

Scientific Name	Common Name	COSEWIC Status*	Provincial Status (CDC)**
<i>Lupinus rivularis</i>	stream bank lupine	E	Red
<i>Bidens amplissima</i>	Vancouver Island beggartick	SC	Blue
<i>Caltha palustris</i>	yellow marsh marigold	-	Blue
<i>Carex amplifolia</i>	bingleaf sedge	-	Blue
<i>Sidalcea hendersonii</i>	Henderson's checker mallow	-	Blue
<i>Carex scoparia</i>	pointed broom sedge	-	Blue
<i>Juncus oxymeris</i>	pointed rush	-	Blue
<i>Leersia oxyzoides</i>	rice cutgrass	-	Blue

**Notes:** \* COSEWIC – Committee on the Status of Endangered Wildlife in Canada: T = Threatened (a wildlife species likely to become endangered if limiting factors are not reversed); SC = Special Concern (a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats); E = Endangered (a species facing imminent extirpation or extinction); NAR = Not At Risk (a species that has been evaluated and found to be not at risk)  
\*\* CDC – Conservation Data Centre: Red = Species that are extirpated, endangered, or threatened; Blue = Species of special concern; Yellow = all species not found on the Red or Blue Lists

The following sections describe the vegetation associated with each ditch segment.

### **North Ditch**

The DIEP North Ditch is directed through bog transition forest (in and around Burns Bog), wetland, and maintained vegetated industrial or rural/agricultural areas. Sensitive ecosystems have been identified adjacent to the North Ditch alignment of the DIEP, and include:

- The provincially red-listed bog plant community, lodgepole pine/sphagnum moss, documented adjacent to the North Ditch segment of the DIEP alignment at 80<sup>th</sup> Street Stormwater Retention Area; and Hammings/Nottingham farms (Crescent Slough), northwest of the 72<sup>nd</sup> Street/60<sup>th</sup> Avenue intersection.
- The red-listed stream bank lupine (*Lupinus rivularis*), and the blue-listed Vancouver Island beggartick (*Bidens amplissima*) documented in proximity to the DIEP North Ditch along the River Road/Fraser River foreshore near 80<sup>th</sup> Street (based on a desktop database review Hemmera 2006).

Burns Bog is a unique ecosystem characterized by approximately 3,000 ha of raised bog hydrology, contains many sensitive ecosystem features, and influences the hydrology of surrounding environments. This area has been historically disturbed by agricultural practices and other anthropogenic activities (Hemmera 2006). Portions of the riparian vegetation in the DIEP North Ditch segment along the River Road/Fraser River foreshore near 80<sup>th</sup> Street north ditch are greater than 30 m in width and consists of deciduous trees and wetland vegetation (**photo 2**). Vegetation along 80<sup>th</sup> Street south of River Road towards the 80<sup>th</sup> Street Stormwater Retention Area consists primarily of manicured grass and landscaped

vegetation, including shrubs, reed canary grass and hardhack alongside the ditches (**photo 3**), and is narrow, ranging from 1 – 3 m in width.

### **South Ditch**

The DIEP South Ditch is directed through cultivated fields (berry and seasonal crops), pasture, turf fields, and disturbed rural/rail/agricultural land use areas. Along Crescent Slough, and traveling south towards Ladner Trunk Road and Churchill Street, the riparian zone is well vegetated, transitioning from bog forest to a narrower (< 15 m) fringe of grasses, shrubs and cultivated fields.

### **West Ditch**

The DIEP West Ditch is directed through highly modified cultivated fields (berry and seasonal crops), pasture, turf fields, and disturbed rural/rail/agricultural land use areas.

### **East Ditch**

The DIEP East Ditch is directed through highly modified cultivated fields (berry and seasonal crops), pasture, and disturbed rural/rail/agricultural land use areas. This portion of the alignment, along Centre Slough and Big Slough contains pockets of mature deciduous trees along the northern bank between the sloughs and the railway, although forested areas in this segment are limited and are within disturbed areas (**photos 12-15**).

## **5.5.2 Wildlife**

The DIEP study area supports a wide range of wildlife species which characteristically occupy lowland delta habitats, modified agricultural lands, and riparian woodlands. Typical wildlife likely to occupy the study area include insects, amphibians, reptiles, birds, and small mammals and, to a lesser extent, large mammals. In addition to common wildlife species occupying the study area, several wildlife species at-risk have been observed in, or potentially occupy, the study area (**Table 5**).

**Table 5 Wildlife Species at Risk Observed and/or Potentially Occurring within the Project Area**

Scientific Name	Common Name	COSEWIC Status*	Provincial Status (CDC)**
<i>Euphyes vestris</i>	Dun skipper	T (Nov 2000)	Blue
<i>Sympertrum vicinum</i>	Autumn meadowhawk	-	Blue
<i>Ardea herodias fannini</i>	Great blue heron, <i>fannini</i> subspecies	SC (May 1997)	Blue
<i>Progne subis</i>	Purple martin, <i>arboricola</i> subspecies	-	Blue
<i>Butorides virescens</i>	Green heron	-	Blue
<i>Anatum</i> and <i>tundrius</i> ssp	Peregrine falcon	SC (Apr 2007)	Red
<i>Hirundo rustica</i>	Barn swallow	-	Blue
<i>Tyto alba</i>	Barn owl	-	Blue
<i>Megascops kennicottii kennicottii</i>	Western screech-owl, <i>kennicottii</i> subspecies	SC (May 2002)	Blue
<i>Asio flammeus</i>	short-eared owl	SC (Mar 2008)	Blue
<i>Buteo jamaicensis</i>	Red-tailed hawk	-	Yellow
<i>Haliaeetus leucocephalus</i>	Bald eagle	-	Yellow
<i>Grus canadensis</i>	Sandhill crane, Georgia Depression population	NAR (Apr 1979)	Blue
<i>Mustela erminea</i>	Ermine	-	Yellow
<i>Sorex rohweri</i>	Olympic shrew	-	Red
<i>Sorex bendirii</i>	Pacific water shrew	E (Apr 2006)	Red
<i>Myodes gapperi occidentalis occidentalis</i>	Southern red-backed vole	-	Red
<i>Sorex trowbridgii</i>	Trowbridge's Shrew	-	blue
<i>Rana aurora</i>	Red-legged frog	SC (Nov 2004)	Blue
<i>Bufo boreas</i>	Western toad	SC (Nov 2002)	Yellow
<i>Acipenser transmontanus</i>	White sturgeon	E (Nov 2003)	Red

**Notes:** \* COSEWIC – Committee on the Status of Endangered Wildlife in Canada: T = Threatened (a wildlife species likely to become endangered if limiting factors are not reversed); SC = Special Concern (a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats); E = Endangered (a species facing imminent extirpation or extinction); NAR = Not At Risk (a species that has been evaluated and found to be not at risk)  
\*\* CDC – Conservation Data Centre: Red = Species that are extirpated, endangered, or threatened; Blue = Species of special concern; Yellow = all species not found on the Red or Blue Lists

High value wildlife habitat within the DIEP is generally limited due to past development and disturbance, and current land use. The majority of habitat available along the DIEP alignment consists of roadside ditches with low wildlife habitat values. Exceptions include the forested area north of River Road, in the North Ditch segment: at the mouth of Tilbury Slough and the Fraser River; the 80<sup>th</sup> Street Stormwater Retention Area; and Crescent Slough and its tributaries; and in the East Ditch segment: an area of deciduous forest along Big Slough. Remnant patches of young forest and landscaped areas with groupings of larger trees provide some valuable habitat to songbirds and raptors. However, the majority

of the forested areas and larger, mature trees in this landscape are not within the assessment area of the DIEP. Wetland and slough habitat exists in the Project area associated with Centre Slough (**photo 18**), Big Slough (**photos 12-15**) and Crescent Slough (**photos 4-7**), providing habitat for waterfowl, great blue heron, and amphibians. Very limited habitat for large mammals exists in the riparian areas for most of the watercourses within the DIEP alignment; these areas are more likely used by small mammals, waterfowl, breeding birds, and raptors.

### **Birds**

Over 100 bird species commonly occupy the regional area surrounding the DIEP, including: water-associated birds (herons, geese, ducks, shorebirds, and gulls), raptors, passerines and woodpeckers, corvids, and other species (doves and pheasants). Agricultural fields, and deciduous/mixed forests are key habitats for terrestrial birds, therefore the riparian habitat within the DIEP is likely secondary habitat for these species, used for foraging rather than nesting or breeding. Water-associated birds likely use watercourses within the DIEP for foraging, nesting and resting.

The provincially blue-listed barn owl (*Tyto alba*) and great blue heron (*Ardea Herodias fannini*); the yellow-listed bald eagle (*Haliaeetus leucocephalus*) and red-tailed hawk (*Buteo jamaicensis*) frequently use the agricultural fields and ditches/sloughs in south Delta, and are observed year-round in the study area (several bald eagles were observed near Boundary Bay Airport during the February 23<sup>rd</sup>, 2010 site visit). The provincially blue-listed western screech owl (*Megascopus kennicottii kennicottii*) (federally listed as Special Concern), and the provincially blue-listed barn swallow (*Hirundo rustica*) and purple martin (*Progne subis*) also have the potential to occur within areas surrounding the study area. Other than these conspicuous and ubiquitous species, other raptors likely to occupy the study area include northern harrier, American kestrel, peregrine falcon, rough-legged hawk, barn owl and short-eared owl. Most raptors forage in open areas, along hedgerows, wetlands and ponds, where they prey on voles (primarily the Townsend's vole), mice, amphibians and small birds (Hemmera 2006).

The agricultural fields and drainage ditches/sloughs present within the DIEP alignment are also frequented by migratory birds, including the Blue-listed sandhill crane, which has been recently recorded in and around Crescent Slough. Extensive field studies and mitigation are currently being conducted for barn owl and sandhill crane in association with the SFPR project.

### **Mammals**

Mammals commonly observed in the study area include coyotes, rabbits (eastern cottontails), raccoons, beavers, muskrat, mink, black-tailed deer, and a variety of different small mammals (rodents, shrews, etc). Due to historical and current land use resulting in disturbed and limited suitable habitats, there has been distributional retreat of many large and medium sized mammals from the study area (Hemmera 2006). Habitat within and beyond the study area, containing large patches of undeveloped or

regenerating woodland habitat, along with bog and/or wetland habitats, are key areas for small and medium/large mammals; however, this habitat is very limited within the DIEP area. A small portion of transitional bog habitat exists along the North Ditch area, potentially providing cover and foraging opportunities for eastern cottontail, coyote and black-tailed deer and nesting and foraging habitat for small mammals. Cultivated fields adjacent to the bog and throughout the rest of the alignment are commonly occupied by small mammals, and are likely used by coyote and black-tailed deer for foraging. Ditches in and along the outer edges of the bog are heavily colonized by muskrat, beaver, and potentially raccoons, and are used for cover, habitat, and foraging for aquatic and semi-aquatic small mammals.

The provincially red-listed and federally Endangered Pacific water shrew (*Sorex bendirii*), the red-listed Olympic Shrew (*Sorex rohweri*), red-listed southern red-backed vole (*Myodes gapperi occidentalis*, *occidentalis*), and the blue-listed Trowbridge's shrew have the potential to occur within the Project area.

Pacific water shrew and southern red-backed voles have been previously confirmed to be present in the area to the east of 80<sup>th</sup> Street in close proximity to the DIEP alignment. Olympic shrew observations have been documented 1 km south of the Fraser River, bordered by Highway 91 to the east and Highway 99 to the south and the west; the last recorded sighting was in 1992. Southern red-backed vole has only had one documented occurrence in Burns Bog in 1999, captured in Pine-Salal habitats around the periphery of Burns Bog. Trowbridge's shrew is the most widespread at-risk mammal occupying the lower mainland (Zuleta and Galindo-Leal (1994)). Most recorded observations, relative to the DIEP, have been on the south side of the Fraser River, and in Burns Bog. Prior to SFPR preload works, in 2009, salvages were conducted for Pacific water shrew and southern red-backed vole in portions of the channel between 72<sup>nd</sup> Street and 80<sup>th</sup> Street, however, neither Pacific water shrew nor southern red-backed vole were captured.

There were no incidental mammal observations made during the February 23<sup>rd</sup>, 2010 site visit. Beaver activity was suspected based on observations of broken and gnawed trees within Centre Slough, though beavers were not observed during this site visit. Beaver activity has also been observed during field visits associated with the SFPR project, particularly around 80<sup>th</sup> Street and Hammings Ditch.

### **Amphibians and Reptiles**

Seven amphibian and two reptile species have the potential to occur in the study area: northwest salamander (*Ambystoma gracile*); long-toed salamander (*Ambystoma macrodactylum*); rough-skinned newt (*Taricha granulose*); pacific tree frog (*Pseudacris regilla*); common garter snake (*Thamnophis sirtalis*); northwestern garter snake (*Thamnophis ordinoides*); and two wide-spread, introduced species: bull frog (*Rana catesbeiana*); and green frog (*Rana clamitans*) (Hemmera 2006). The red-legged frog (*Rana aurora*) is a SARA Schedule 1 species, and is blue-listed provincially, and the yellow-listed western toad (*Bufo boreas*) also have the potential to occupy the study area, particularly in association with watercourse adjacent to forested cover. Red-legged frogs have been recorded and observed in areas of

Surrey and Delta as part of amphibian surveys for the SFPR monitoring program, and western toads have been recorded south of Tilbury Island (near Crescent Slough). Neither species have been observed or recorded directly within the DIEP area, however, they have the potential to occur based on the availability of suitable habitats (i.e., watercourses with emergent vegetation and adjacent forested cover).

There were no incidental amphibian or reptile observations made during the February 23<sup>rd</sup>, 2010 site visit.

### **Insects**

Insects commonly occurring in the study area include dragonflies and damselflies, aquatic and semi-aquatic insects; butterflies and terrestrial insects. Many of these insects spend their entire lives in or on the aquatic environment, and some occupy aquatic habitat in addition to terrestrial areas. Aquatic insects are important converters of detritus and other plant materials to more concentrated protein, and are an important part of the diet of many vertebrate species (e.g., fish, water-associated birds, and small mammals) associated with these habitats. Dun skipper (*Euphyes vestries*) is a blue-listed dragonfly that has been found in Burns Bog along the eastern trails, south of 72<sup>nd</sup> Avenue. The last recorded observation of Dun skipper near the Project area was in Burns Bog in 2005 (Hemmera, 2006; CDC search). Since the last observation, a fire impacted portions of Burns Bog, including dun skipper habitat, and there have not been recent observed recordings of dun skipper in this area or in other areas within the DIEP area. Autumn meadowhawk (*Sympertrum vicinum*) is a blue-listed dragonfly that prefers bog, wetland and shallow water. In 1998 an autumn meadowhawk was found in Burns Bog at the intersection of 72<sup>nd</sup> Avenue at the east edge of the bog (Hemmera 2006; CDC search). This invertebrate has been known to live in terrestrial shrub land and grass lands; however there have been no recently recorded observations of Autumn Meadowlark in the Project area.

## 6.0 VALUED SOCIO-ECONOMIC COMPONENTS

### 6.1 LAND USE

Groundwater usage within this region of the CoD is unlikely to be prevalent due to the suspected high salinity of groundwater in the lowland areas of Delta (Golder 2006). Research using the BC Water Resource Mapping indicated that there are six water wells within proximity of the DIEP: three near the 80<sup>th</sup> Street intake; one within proximity to Crescent Slough; one near Centre Slough; and one north of Big Slough. These are not domestic wells, are not used for drinking water and their use is likely industry-based. There are no domestic wells within the Project area (MoE BC Water Resources Atlas 2010).

Irrigation ditches throughout southwest Delta have improved drainage issues throughout the agricultural lands and flushing of saline deposits (MAL 1991). A large percentage of the soil-based farms in the study area practice crop rotation to improve soil quality, control diseases, and increase crop variety.

The majority of the DIEP is associated with lands that have been previously disturbed by agricultural, development or industrial land use. The DIEP North Ditch segment is adjacent to industrial and linear development corridors (rail, utilities, existing roads and highways, and the SFPR alignment). Approximately 1 km of the DIEP is directed through the Tilbury Industrial Park, in the northern portion of the DIEP North Ditch, and approximately 7.4 km is directed through existing drainage ditches adjacent to agricultural and rural residential areas. There is the potential for contaminated sites to exist in the aforementioned northern portions of this segment, due to current and previous land uses and activities within the Tilbury Industrial Park.

Travelling south towards Crescent Slough, the land use adjacent to the DIEP alignment is agricultural, along with a utility corridor (sanitary sewer line) on the east side of Hammings Ditch and Crescent Slough. Near the southern portion of Crescent Slough towards Ladner Trunk Road, there is undeveloped land (CIMD property), agricultural lands, and existing major roads (including the Vancouver Landfill access road, Highway 99, and 72<sup>nd</sup> Street).

Along the DIEP South Ditch, approximately 2.5 km of the proposed alignment is directed along a rail ROW and agricultural area. Along the DIEP West Ditch, approximately 7.2 km of the DIEP is directed through existing rural residential roadside and agricultural ditches. The entire South Ditch and West Ditch segments are adjacent to agricultural land and railway corridors. There is a low probability for contaminated materials to be present along these portions of the DIEP alignment, based on previous and current agricultural/rural/rail land uses. Contamination associated with rail lines is typically constrained to the rail ROW, and is considered unlikely to migrate into the DIEP area. Along the DIEP East Ditch; approximately 6.7 km of the DIEP is directed through an existing drainage ditch (Centre Slough) along a rail ROW, approximately 1.6 km through agricultural property, and 1.6 km through existing agricultural and rural residential drainage ditches.

## 6.2 NAVIGABLE WATERS

Under the *Navigable Waters Protection Act* (NWPA), a waterbody is considered navigable if it „is capable of being navigated by floating vessels of any description for the purpose of transportation, commerce or recreation“. The NWPA applies to both inland and coastal waters, and is intended to warrant safe navigation of vessels within Canada's waters. Vessels are considered watercraft ranging from pleasure craft and fishing vessels to large cruise ships and cargo vessels, that are built, equipped, operated and crewed according to standards and regulations set and enforced by Transport Canada (Transport Canada 2010).

Several of the larger sloughs within the DIEP are also considered navigable by small watercraft, particularly Big Slough, Crescent Slough and portions of Centre Slough. The intake pipe portion of the DIEP North Ditch is to be located in the Fraser River, which is considered „navigable“ under the NWPA. Based on consideration of guidance available online from Transport Canada regarding water intakes that can be considered to be minor works under NWPA, it appears unlikely that the proposed DIEP intake pipe will be excluded from a permit under the NWPA (i.e., proposed works do not appear to meet various criteria/standards, including: the intake pipe will likely be greater than 10 cm diameter; intake pipe will likely not lie entirely on the river bed; and the proposed infrastructure is likely to be less than 50 from a navigation channel).

## 6.3 ARCHAEOLOGY

Golder and Associates conducted an archaeological impact assessment (AIA) in September 2006 as part of the environmental impact assessment of the SFPR project. The SFPR corridor has a rich archaeological heritage, which includes a number of previously identified sites which have high archaeological values. An archaeological site has been identified near Crescent Slough, and has been subject to activities that potentially alter archaeological resources, including agricultural activities, construction of drainage channels, slough dyking, ground levelling, sewer installation, road construction, and contamination clean-up. This area has been shown to have high archaeological value due to the presence of multi-component midden and intact deposits over a large area. This site is considered a late Marpole and Developed Coast Salish culture site and has been interpreted to represent an area of light activity, possibly for repeated short-term visits by small groups for resource extraction and/or processing, and other subsistence-related activities (Nicholas *et al.* 2005). The presence of a gun flint from the site also suggests this location was utilized into the post-contact period.

A second site was identified within proximity of the DIEP alignment, near 72<sup>nd</sup> Street and the location of the North Control gate (**Figure 1**). This site was identified during monitoring of geotechnical boreholes in 2006, and additional fieldwork conducted in 2009 to further delineate the site. The origin of the site materials is unknown. This area has also been highly impacted due to farming and related activities in the area. Based on the close proximity of the sites identified for the SFPR project, it is assumed that there is potential for archaeologically valuable sites to be present in the DIEP area.



At this time, archaeological investigations for the construction of the DIEP have not been conducted. A qualified Archaeological professional will be retained by the MoT to complete applications to the BC Ministry of Tourism, Culture and the Arts, and archaeological investigations. Archaeological investigations will be completed before construction works commencing, as per the requirements set out within the *Heritage Act*.

#### **6.4 NOISE**

Residents in the vicinity of the Project area inhabit residential developments in the vicinity of Highway 17, Highway 10, Highway 99 and Deltaport Way which are subject to noise from high traffic levels and associated vehicular, aerial, and rail usage.

In 2004, BKL Consultants completed a baseline noise impact assessment as part of the SFPR Environmental Assessment Application. Survey sites were established within portions of southwest Delta revealed that the current noise conditions in the area hold baseline volumes at 58.2 dBA for the day-night average noise control level contributed by air, and rail traffic (RDWI 2006). A wide range of baseline residential noise environments exist within the DIEP corridor, where daily average noise exposures were found to vary from  $L_{eq}(24)$  48.2 to 67.1 decibels (dBA). The main reason for this variation is that the dominant noise sources vary widely from place to place, with some sites being dominated by traffic noise (i.e., near the highways), some by industrial noise distant rail, road or aircraft noise sources, as well as noise from agricultural activities.

## 7.0 POTENTIAL IMPACTS AND PROPOSED MITIGATION

This section identifies and discusses the potential impacts of the Project on the VECs and VSCs and recommends measures to mitigate, minimize or avoid potential adverse environmental effects. **Table 6** summarizes a list of the potential environmental components that may be impacted by Project activities, which are discussed in the following sections.

**Table 6: Potential Project-Related Impacts on VECs and VSCs**

Project Components	VECs					VSCs			
	Water Quality	Soils and Terrain	Air Quality	Fish and Fish Habitat	Vegetation and Wildlife	Land Use	Navigable waters	Archaeology	Noise
<b>Project Construction</b>									
Site preparation and vegetation clearing	X	X	X	X	X	X	X	X	X
Ground works including excavation, constructions of embankments	X	X	X	X	X	X	X	X	X
Construction of temporary parking and storage areas	X	X	X	X	X			X	X
Preload fill placement	X	X	X	X	X				X
Construction of new ditches	X	X	X	X	X	X	X	X	X
Construction of upgrades for existing ditches	X	X	X	X	X	X	X	X	X
Fill placement and bank stabilization	X	X	X	X	X		X		X
<b>Project Operations</b>									
Accidents and Malfunctions	X	X		X	X	X	X	X	X
Road and ditch maintenance	X	X	X	X	X	X	X		X

## **7.1 POTENTIAL IMPACTS AND PROPOSED MITIGATION - VECs**

### **7.1.1 Water Quality**

#### ***7.1.1.1 Potential Impacts and Mitigation***

Improper management of surface water and sediment runoff (including the introduction of deleterious substances) during the construction and maintenance activities may impact water quality and aquatic habitat. It may also increase erosion, thereby directly or indirectly introducing sediment into watercourses. Exposed soil from clearing and streamside construction/maintenance activities can easily be transported into watercourses, impacting water quality and aquatic habitat. Site preparation activities have the potential to impact water quality by introducing increased concentrations of metals, ions, nutrients, organic compounds (e.g., hydrocarbons, and oil and grease), and sediments into nearby watercourses.

The broad categories of potential impacts associated with construction and maintenance (during Project operations) activities may include:

- Impacts to surface water quality from fuel or oil leakage from construction equipment and vehicles or temporary storage areas; and
- Sediment laden runoff from excavation and construction activities (i.e., soil stockpiles, clearing, grading, staging areas near watercourses, stone column installation and pile driving).

To mitigate or minimize the potential for water quality impacts during the construction phase and during maintenance activities during Project operations, activities should be conducted in a manner that provides for compliance with federal and provincial environmental requirements and instream work Best Management Practices (BMPs) works. Project site-specific measures should be applied to mitigate soil erosion and shallow slope movement, to control sediment laden flows and to prevent excess sediment from entering watercourses. Mitigation may include the following measures:

- Maintain riparian leave strips;
- Minimize disturbance of vegetation and soil;
- Minimize soil erosion and implement sediment control measures;
- Minimize exposing soil;
- Maintain natural drainage patterns wherever possible;
- Place excavated materials as far as possible from watercourse channels;
- Minimize the length and steepness of slopes to reduce the risk of erosion and sediment loss;
- Stabilize and revegetate disturbed areas with native species; and
- Keep fuelling stations at a distance greater than 30 m from a watercourse riparian protection area.

### **7.1.1.2 Conclusion**

The surface water quality in the majority of the agricultural ditches within the DIEP is generally considered to be relatively low, particularly for value to native aquatic species during the warmer summer months (i.e., high water temperatures and low dissolved oxygen). Any Project-related impacts to surface water as a result of the DIEP are anticipated to be infrequent and reversible, and offset in the long-term by the substantial benefits that the Project will confer to surface water quality within the study area. If the mitigation measures outlined above for construction and maintenance activities are followed, it is anticipated that the potential impacts to existing water quality can be avoided and/or mitigated.

The operations phase of the Project is expected to result in positive effects to surface water, including improvements to water quality through increased concentrations of dissolved oxygen; and decreasing temperature and decreasing concentrations of contaminants through dilution.

No residual impacts to water quality as a result of the Project are anticipated.

### **7.1.2 Soils and Terrain**

#### **7.1.2.1 Potential Impacts and Mitigation**

Construction and maintenance activities such as the clearing of vegetation, excavation of soil and storage of excavated soil and materials, filling, placing and compacting of soil for the construction or modification of ditches can have the following potential negative impacts on soil quality and terrain:

- Loss of top soil through erosion and excess storm water runoff from stockpiled soil;
- Soil compaction from construction equipment and vehicles;
- Contamination caused by accidental spills of deleterious material (i.e., oils, lubricants, or fuel); and
- Decreased bank stability through erosion due to additional water flow in channels.

During Project construction phase and maintenance activities during Project operations, BMPs should be applied to avoid or mitigate potential impacts associated with the Project. Mitigation measures may include, but are not necessarily limited to, the following:

- Disturbed areas should be re-vegetated with a native weed mix as soon as possible and where appropriate;
- Removed topsoil should be stockpiled and used for re-vegetation, as appropriate, at the completion of construction;
- Erosion, run-off, and sediment control measures should be implemented as required, including limiting the size of area that is exposed at any one time; and

- All generated waste should be appropriately contained, collected and recycled/disposed of at appropriate locations and in accordance with all applicable legislation, guidelines, and BMPs.

#### **7.1.2.2 Conclusion**

The existing soil quality in the Project area is described as having moderate limitation in terms of crop production. Limitation such as salinity, poor drainage, aridity and undesirable soil structure prohibit the soil's production capacity in the absence of irrigation and fertilization application. Due to the increased channel width, and increased water flow occurring in the newly modified watercourses within the DIEP, the terrain and soils associated with these channels have some potential to erode and lose stability as a result of the modified conditions. The bank stabilization measures outlined above will be applied, where required, to ensure that these potential impacts are minimized. No residual impacts to soils and terrain are anticipated.

Any impacts associated with reduced soil quality, or erosion effects during the operational phase, are expected to be infrequent and limited to the local Project area. The impacts can easily be reversed and minimized or avoided if the mitigation measures outlined above are implemented during constructions. It is expected that the Project will generally improve drainage and irrigation, resulting in improved production capacity.

No residual impacts to soils and terrain as a result of the Project are anticipated.

#### **7.1.3 Air Quality**

##### **7.1.3.1 Potential Impacts and Mitigation**

During the construction phase and maintenance activities, there is the potential for a reduction in local air quality due to emissions from equipment; machinery; and fugitive dust created during site clearing, soil stockpiles, groundworks, asphalt application, transportation of materials, pre-loading with fill material, and infrastructure construction; potentially contributing to a reduction of local air quality. Air quality impacts as a result of construction and maintenance work can also result when dry soils are excavated or wind blown off of construction vehicles and exposed ground surfaces.

The resultant impacts to air quality can therefore be summarized as follows:

- Particulate matter from preloaded material existing on roads and being disturbed by equipment and vehicles;
- Wind erosion on stockpiles or exposed soils;
- Emissions from construction vehicles and combustion engines; and
- Idling vehicles.

Mitigation measures for reducing impacts to loss of air quality can include:

- Application of water or another environmentally acceptable dust suppressant to minimize the incidence of fugitive dust during clearing activities or other construction activities that create dust conditions;
- Cover soil stockpiles and use water or another environmentally acceptable dust suppressant on the soil stockpiles when the soil is dry;
- Use covers on trucks, where possible, while transporting material to and from the site;
- Construction vehicles and equipment should be well maintained, and shut off when not in use to minimize exhaust fumes from idling;
- Minimize exposed areas and revegetate exposed soils as soon as possible; and
- Sweeping of roadway surfaces reducing the potential for airborne particulate matter.

#### **7.1.3.2 Conclusion**

Ambient air quality objectives and standards within the Project area are within acceptable concentration levels based on air quality assessment completed for the SFPR project (RWDI 2006).

The potential impacts are expected to be (temporary) limited to the construction/maintenance phases of the Project, reversible, and will be dependent on the activity and equipment used. The impacts are anticipated to be minimal if the appropriate mitigation measures are in place. During the operations phase of the Project, air quality is expected to return to ambient conditions and no potential impacts from standard operation of the DIEP are expected. When applicable, the above mitigation will be applied to traffic and machinery use during the maintenance activities associated with the operations phase.

No residual effects to air quality are anticipated.

#### **7.1.4 Fish and Fish Habitat**

##### **7.1.4.1 Potential Impacts and Mitigation**

The following impacts to fish and fish habitat have the potential to occur during the construction phase of the Project and during maintenance activities:

- Temporary direct loss or disturbance of habitat;
- Introduction of sediment into watercourses from excavation and construction activities;
- Accidental spills of deleterious material (i.e., oils, lubricants and fuel); and
- Modification of habitat compensation sites.

##### Habitat Loss/Disturbance:

The majority of riparian clearing impacts will occur during the expansion of existing ditches. These impacts are considered reversible, as the clearing will be temporary following replanting activities and the

ditches are classified as yellow-coded and occupied by resident fish species. Proposed works within high value (red-coded) fish habitat occupied by salmonid species will be restricted to the width of the 80<sup>th</sup> Street intake pipe placement along the Fraser River foreshore, with the resultant impacts relatively small in scope and temporary in duration. Although the pump station and intake design has not been completed, preliminary site investigations indicated that the pump station can be located within the ditch corridor and/or adjacent upland areas on the south side of River Road where low fish habitat values apply. Furthermore, there appear to be opportunities for intake alignment which will provide for minimal impacts on higher value tidal wetland and/or adjacent foreshore areas on the north side of River Road.

Construction and modification of watercourses may include measures to isolate work sites to create „in the dry“ conditions, which may include dewatering and confining portions of watercourse segments, where necessary. Instream works will be conducted within the appropriate fisheries timing windows whenever feasible to minimize impacts to fish and fish habitat. In those cases where construction work is to be undertaken outside the applicable default timing windows, a QEP will develop appropriate mitigation measures to minimize potential impacts to fish and other aquatic species (e.g., amphibians).

#### Introduction of Sediment into Watercourses:

Improper management of surface water and sediment runoff (including the introduction of deleterious substances) during the construction/maintenance activities may impact water quality and fish habitat. Decreased bank stability during construction may also increase the potential for erosion, thereby introducing sediment directly or indirectly into watercourses. Site preparation activities have the potential to impact fish habitat by introducing increased sediments into nearby watercourses.

#### Accidental Spills:

Improper management of or accidents involving hazardous substances during the construction/maintenance activities may impact water quality and fish habitat. Site preparation activities have the potential to impact fish habitat by introducing increased concentrations of metals, ions, nutrients, organic compounds (e.g., hydrocarbons, and oil and grease), into nearby watercourses.

#### Alteration of Existing Compensation Site:

A fish habitat compensation site currently exists within the Churchill Channel located north of Churchill Street, between 72<sup>nd</sup> Street and 80<sup>th</sup> Street. The compensation works included the construction of a large drainage ditch to compensate for the ditches lost to development south of Churchill Street, and planting of native vegetation within an area of approximately 50 m long and 9 m wide. This work was conducted by others in concordance with DFO and has had a low success rate (approximately 3%) (Matt Hunter of MoT; *pers. comm.*). Although MoT will be considered ultimately responsible for the restoration or replacement of these works, MoT will consult with the CoD to determine specifics on how these restoration and/or replacement works will be implemented.

### Mitigation Measures:

To mitigate or minimize the potential for impacts to fish and fish habitat during the construction phase and maintenance events of the Project, activities will need to be conducted in a manner that provides for compliance with federal and provincial environmental requirements and instream work BMPs. Project site-specific measures should be applied to mitigate soil erosion and shallow slope movement, to control sediment laden flows and to prevent excess sediment from entering watercourses. Mitigation may include the following measures:

- Schedule instream works to comply with appropriate timing windows, whenever feasible;
- Conduct works “in the dry” and with fish salvages, especially if timing windows cannot be readily complied with;
- Follow the DFO Freshwater Intake End-of-Pipe Fish Screen Guidelines;
- Maintain riparian leave strips;
- Minimize disturbance of vegetation and soil;
- Stabilize and revegetate disturbed areas with native species;
- Minimize soil erosion and implement sediment control measures;
- Minimize exposing soil;
- Place excavated materials as far as possible from watercourse channels;
- Minimize the length and steepness of slopes to reduce the risk of erosion and sediment loss;
- Keep fuelling stations at a distance greater than 30 m from a watercourse riparian protection area.
- All generated waste should be appropriately contained, collected and recycled/disposed of at appropriate locations and in accordance with all applicable legislation, guidelines, and BMPs; and
- Ensure that any unavoidable impacts to the Churchill Channel fisheries compensation site as a result of the DIEP are properly addressed, either through restoration activities onsite and/or efforts to provide appropriate replacement habitats in accordance with DFO requirements.

#### **7.1.4.2 Fish Access Considerations**

The following sections provide more information on the potential benefits or constraints to fish access, and the mitigation recommended. Particular focus is on the 80<sup>th</sup> Street intake, Green Slough, Chillukthan Slough, and Centre Slough irrigation control structures during the operations phase:

##### 80<sup>th</sup> Street/Fraser River:

Water will be allowed to flow from the Fraser River into the irrigation system through the flood boxes during high tides and through the pump station during low tides. Approximately one third of the total water intake will be by gravity through the flood boxes. The access area will be significantly increased from a



single 600 mm diameter sluice gate to double 1.5 m by 3.0 m swing gates and the average gravity inflow will be increased by more than ten-fold. This will in turn provide a greater opportunity for fish (including salmonids) access through this structure and into upstream areas. Furthermore, the removal of the 80<sup>th</sup> Street baffle near the Delta Community Animal Shelter will increase connectivity within the ditch system and the potential for salmonids to access upstream areas.

Crescent Slough/Green Slough:

Fish access into Crescent Slough, including juvenile salmonids associated with the Fraser River (via Green Slough), will be improved at this located as a result of increasing the size of the control gate opening from small sluice gates to a large swing gate. This gate, associated with the flood box with the canal gate, will maintain connectivity with the Fraser River over a larger range of tidal elevations. Periods when waters from the Fraser River will be allowed to flow into the system through the swing gate will be driven by salinity levels in the Fraser River, with the late summer salt wedge resulting in some limited connectivity constraints.

Chillukthan Slough:

Similar to the Green Slough Control Gate and fish (including juvenile salmonid) access into Crescent Slough, connectivity to Chillukthan Slough will be improved at the lowest control gate in this system as a result of increasing the size of the control gate opening from small sluice gates to a large swing gate. The proposed changes to Chillukthan Slough will improve fish access at this location as the inlet has increased from a small sluice gate to a large swing gate, over a larger range of tidal elevations (higher than the water level in Chillukthan Slough), and when the salinity of the Fraser River is acceptable for irrigation. Further up in the system, limited existing fish access through the Mason control gate will be maintained without any notable change. Water quality throughout the Chillukthan Slough system will, however, be improved and be more favorable for fish given the increase water supply from the north.

While there are no provisions for accommodating fish access through the 28<sup>th</sup> Avenue and 64<sup>th</sup> Street lift station, fish movement will be otherwise unobstructed throughout this segment of the irrigation system. While connectivity within the irrigation network further upstream of these control structures may not be improved, these portions of the Chillukthan Slough system are of less value as potential rearing habitat for juvenile salmonids than downstream reaches. It is anticipated that increased water flow and corresponding water quality improvements will still improve habitat conditions for resident fish in areas like this, where potential value for salmonids are generally limited.

Centre Slough:

It is apparent that construction of a new control gate at this location has the potential to impact fish movement, particularly the movement of juvenile salmonids into non-natal rearing habitats upstream. Specific fisheries-related requirements for fish passage at the Centre Ditch Control Gate will need to be determined and will be incorporated in the final design of this structure.

#### Charlton Ditch and 104<sup>th</sup> Street Lift Station:

For the Charlton Ditch and 104<sup>th</sup> Street Lift Station, the movement of juvenile salmonids into previously accessible non-natal rearing habitats may be impacted without special considerations for the maintenance of connectivity. Specific considerations for fish passage at this lift station are therefore required, with the resultant determinations to be used to develop a final design that accommodates fish (e.g., fish-friendly screw pump(s)).

#### Big Slough Control Gate:

It is anticipated that there will be a vertical separation of approximately 0.6 between the water levels on the two sides of the Big Slough Gate during the irrigation season, resulting in potential impacts on upstream fish passage within Big Slough. Given that this slough has high value fisheries, including the provision of a key migration corridor for adult salmon moving into headwater stream habitats to spawn, fish passage will need to be addressed in the final design of this proposed control gate in order to ensure that these values are not impacted (e.g., fish ladder).

#### Oliver Control Gate:

Fish access is not anticipated to change at the Oliver Control Gate as a result of these proposed works. Fish access into Big Slough will continue to be feasible through the swing gates during receding tide, and when the tide elevation and water level in Big Slough are above the crest of the baffles. The proposed installation of a “fish-friendly” pumpstation by the CoD, will however, improve the out-migrating opportunities for juvenile and small bodied fish into Boundary Bay during the high portion of the tide cycle. These opportunities are currently limited to when the flood boxes are open at the low end of the tide cycle during the drainage season.

#### **7.1.4.3 Conclusion**

The existing conditions surrounding the Project area have been extensively modified by human use and natural ecosystem values are limited. Although potential effects on fish and fish habitat will be dependent upon the final design for the Project, impacts are expected to be primarily associated with the construction phase. Appropriate mitigation measures will identified and implemented in order to limit any impacts on fish and fish habitat during construction and any construction-related impacts are expected to be low in magnitude and limited to the extent of the Project area.

Changes in water flow are expected during the operational phase, as the Project involves widening of existing channels, installation of new channels, and increasing water flow throughout the alignment. Watercourses with a flow rate of 0.9 m/s for areas greater than 24 metres in length may be considered unsuitable for fish movement. Watercourse channels associated with the DIEP are generally characterized by low gradients and flow rates are not expected to exceed 0.5m/s. The DIEP is therefore not expected to increase existing water flow rates resulting in conditions unsuitable for fish movement.

Instead, increased water flow is expected to provide substantial improvements in overall water quality within the irrigation system.

Although the DIEP is expected to improve connectivity for juveniles salmonids migrating from the Fraser River mainstem into nearby rearing habitats of ditches and sloughs, dry summer periods with infrequent precipitation events may pose some limitations on the frequency out-migration opportunities for rearing salmonids. As a result, it will be important to ensure that appropriate operational management is applied to ensure that out-migration opportunities are properly facilitated. This may include, but not necessarily be limited to, the provision of occasional flushing flows at the outlets of the key slough systems.

It is anticipated that with the proper mitigation in place, the proposed works will result in a positive impact to fish following construction. Completion of the project will result in increased connectivity, ditch channel widths/depths, water flow rates and improved water quality which are expected to generally improve fish habitat values within the DIEP area. Access for juvenile salmonids into the DIEP channels will be generally improved during the late winter to late spring period, when juvenile Chinook and/or coho might be expected to enter the North and West ditches. Providing that operations provide appropriate considerations for out-migrating juvenile salmonids, it is anticipated that the overall benefits of DIEP to the fisheries resource can be optimized.

### **7.1.5 Vegetation and Wildlife**

#### ***7.1.5.1 Potential Impacts and Mitigation***

The following impacts to vegetation and wildlife have the potential to occur during the construction phase and maintenance activities of the Project:

- Direct loss or disturbance of vegetation and wildlife habitat;
- Introduction of sediment into watercourses;
- Accidental spills of deleterious material (i.e., oils, lubricants and fuel);
- Introduction of invasive species.
- Wildlife mortality from potential collisions between wildlife and construction equipment and/or vehicles during construction; and
- Sensory disturbance resulting from noise generated during active construction.

The mitigation measures recommended to avoid impacts to fish and fish habitat (**Section 7.1.4**) are expected to mitigate impacts to vegetation and wildlife in the Project area, in addition to the following:

- Conduct pre-construction surveys for sensitive and at-risk vegetation;
- Conduct pre-construction surveys for sensitive wildlife/wildlife use (nests, etc);
- Conduct wildlife salvages and sensitive plant relocations for species at risk, if appropriate;

- Adhere to appropriate wildlife timing windows; and
- Implement invasive species control measures.

#### **7.1.5.2 Conclusion**

The existing conditions surrounding the Project area have been largely modified by human use and natural ecosystem values are limited. In addition, it is noted that some potential site-specific impacts on vegetation and wildlife may be still be avoided or minimized through final design. With the exception of accidental mortality resulting from wildlife-vehicle/equipment collision, the impacts are expected to be reversible, and/or easily mitigated or avoided.

Pacific water shrew and small mammal salvage activities are planned for 72<sup>nd</sup> Street, Wilson Ave/Brown Street and 80<sup>th</sup> Street ditches. These locations were identified for salvage work based on habitat suitability for Pacific water shrew and southern red-backed vole, and salvages will be conducted prior to the start of ditch widening activities associated with the DIEP. Depending on the results of the pre-construction surveys for sensitive species, there is the potential for effects on at-risk plants and small mammals (including Pacific water shrew) and salvages/relocations may be required.

Impacts resulting from maintenance activities are anticipated to be infrequent, limited to the duration of the activity, and reversible. If the appropriate mitigation measures are in place, there is a low likelihood that Project activities will results in additional impacts to wildlife and wildlife habitats.

With the proper pre-construction surveys and applicable mitigation applied, residual impacts to vegetation and wildlife are not anticipated.

## **7.2 POTENTIAL IMPACTS AND PROPOSED MITIGATION - VSCS**

### **7.2.1 Land Use**

#### **7.2.1.1 Potential Impacts and Mitigation**

Construction and maintenance activities including site preparation work, excavation of soil and storage of soil from excavation works associated with widening or construction of ditches, filling, placing and compacting of soil for the construction of road and bridge structure may have the following potential impacts on land use within the Project area:

- Farming activities impacted by construction traffic; and
- Disturbance of livestock by construction activities.

These potential impacts would be confined to the construction or maintenance period (thus would be temporary in nature), and are expected to be offset by the ongoing benefits to agriculture that are expected as a result of the Project's operations phase.

### **7.2.1.2 Conclusion**

The potential impacts of construction and maintenance activities on land use are anticipated to be temporary, reversible, and localized to the Project area. Positive impacts are expected to result during the Project operations, including improvements to land use opportunities, particularly for farming and agriculture, and increased crop success/agricultural opportunities due to irrigation infrastructure enhancement.

As such, with the appropriate mitigation measures are in place there is a low likelihood that Project activities will results in adverse impacts to land use. Mitigation is not required as the impacts during the operations phase are expected to be positive; residual adverse impacts are not anticipated.

## **7.2.2 Navigable Waters**

### **7.2.2.1 Potential Impacts and Mitigation**

Project construction and maintenance activities occurring in navigable waters (particularly near the intake of the Fraser River at 80<sup>th</sup> Street, Crescent Slough, and Big Slough) may have the following potential impacts:

- Temporary access restrictions; and
- Accidents associated with construction interference.

The DIEP design and construction will comply with the requirements under the NWPA and related permit conditions. Mitigation measures implemented to avoid impacts to navigation of the affected watercourses may include:

- Pre/post construction equipment staging areas;
- Construction timing and methodology;
- Development and implementation of protocols for navigation safety communications in consultation with the NWPD, commercial and recreational marine stakeholders, First Nations and Marine Communication and Traffic Services of the Canadian Coast Guard (MCTS/CCG); and
- Placement of warning signs placed at appropriate locations in the waterway around the construction zone to advise small craft of the work in progress.

### **7.2.2.2 Conclusion**

The potential impacts of construction and maintenance activities on navigable waters are anticipated to be temporary, reversible, restricted to the construction phase and maintenance phases of the navigable waters within the DIEP. With the appropriate mitigation measures are in place there is a low likelihood that Project activities will results in adverse impacts to land use.

During Project operations, the DIEP is expected to widen and deepen existing channels in a wide variety of watercourses within the Project area, including navigable waters. This is considered to result in enhanced potential for navigational use of these waterways. Where maintenance activities have the potential to disturb navigable waters, the above mitigation will be applied. Post-construction mitigation will include consultation with users of the waterways and with the NWPD, as required.

Residual adverse impacts to navigable waters are not anticipated.

### **7.2.3 Archaeological use**

#### ***7.2.3.1 Potential Impacts and Mitigation***

The construction phase of the Project has the potential to discover or disturb unidentified artefacts in the DIEP area. With the pre-construction work and mitigation discussed below, impacts during the operations phase of the Project (including during maintenance) are not expected.

The mitigation to avoid the potential to disturb unidentified sites entails conducting a pre-Project archaeological overview assessment (AOA). An AOA of the study area will be carried out, including modelling to identify areas of archaeological potential for future field investigations. Based on the AOA, field investigation and further study of known archaeological sites will be undertaken (i.e., an Archaeological Impact Assessment (AIA)), if appropriate. It is our preliminary understanding that the currently proposed alignments for the DIEP may trigger the need for an AIA, at a minimum of two locations where the works may impact known sites within the Project area (within the DIEP East Ditch). An archaeological investigation will be completed in the future as part of the scope of this project.

Archaeological assessment(s) will be conducted to an appropriate level, consistent with the BC Archaeological Impact Assessment Guidelines, and concurrent with CEAA review, for the implementation of the irrigation enhancement works. An archaeologist will be engaged to conduct these studies, and members of interested First Nations will be invited to provide ethnographic background, comment on site significance, and to participate in field programs. If an undocumented site is identified during the DIEP works, the site will be immediately reported to the British Columbia Archaeology Branch and to interested First Nations, and then investigated and assessed under the terms and conditions of a valid *Heritage Conservation Act (HCA)* permit.

To the appropriate level indicated by preceding archaeological studies, various mitigation strategies may be implemented that at a minimum will include the use of the Chance Find document produced for the South Fraser Perimeter Road Project. Additional mitigation strategies that could be employed include systematic data recovery or archaeological monitoring, under *HCA* Section 14 Heritage Investigation permits, or Section 12 Alteration permits.

### **7.2.3.2 Conclusion**

The potential impacts of the Project on archaeological sites are anticipated to be mitigated through the measures outlined above. Providing that the appropriate measures are taken during the pre-construction and construction phases of the Project, works associated with maintenance activities are not anticipated to result in disruption to existing archaeological resources, or the discovery of unidentified archaeological resources.

Impacts to archaeological values are not expected during the operations phase of the Project, and no residual adverse effects are not anticipated.

## **7.2.4 Noise**

### **7.2.4.1 Potential Impacts and Mitigation**

Increased noise levels above ambient conditions as a result of construction and maintenance activities may have a negative impact on local residences in proximity to the Project area. BMPs will be in place to mitigate the impacts on sensitive receptors within the Project area during construction. The following mitigation measures are focused on reducing and muffling noise produced by Project machinery, timing of noise-related works, and communication with the local community:

- Orient stationary equipment emitting elevated noise levels, towards existing noise or large objects;
- Shut-down equipment when not in use;
- Ensure machinery is in good condition prior to construction and that contractors do not utilize excessively noisy equipment.
- Adhere to appropriate timing windows (construction will occur between 7:00 AM and 7:00 PM, Monday through Friday and 9:00 AM to 5:00 PM on Saturdays); and
- Provide advanced notice to local residents of scheduling and scheduling changes for construction activities.

### **7.2.4.2 Conclusion**

Residents in proximity to the Project area are currently subject to noise produced from Highway 17, Highway 91, Highway 10, rail traffic, BC Rail Line, and overhead air traffic. As such, sensitive receptors within the Project area (wildlife and residential) are exposed to significant levels of ambient noise, and based on the nature of the Project, increases in noise above the existing conditions are not expected.

## 8.0 CUMULATIVE ENVIRONMENTAL EFFECTS

### 8.1 SUMMARY OF RESIDUAL EFFECTS

Cumulative effects are the incremental effects of an action on the environment when the effects are combined with those from other past, existing or future actions or projects (Hegmann *et al.* 1999). They consider the combined residual effects, the effects of the Project and Project effects on a particular environmental impact on a particular ecosystem component, where they overlap in space and time.

The proposed DIEP will provide for increased capacity of existing irrigation infrastructure, through widening/deepening of existing drainage ditches. The majority of potential effects on the physical environment that are typically associated with construction projects of a similar nature (i.e., water quality, air quality, etc.) can be mitigated through the application of proven BMPs as outlined in the **Section 7.0**. While the Project will result in some short term adverse effects on specific VECs, the effects are considered reversible taking into account the recommended mitigations and restoration works. Improvements to fish access, irrigation, navigation, and water quality as a result of the Project are also anticipated to provide an overall improvement of fish habitats (including salmonid habitats).

As the DIEP is not expected to result in any residual effects, there is no opportunity for synergistic effects between residual effects of DIEP and residual effects of other projects in the study area. As such, there are no cumulative effects anticipated as a result of the DIEP.



## 9.0 ACCIDENTS AND MALFUNCTIONS

Accidents and malfunctions are infrequent and unplanned impacts on the environment resulting from the construction or operation of a project. To mitigate the impacts for unplanned accidents and malfunctions over and above those mitigation measures already described in **Section 7.0**, specific contingency measures should be implemented.

### 9.1 CONSTRUCTION

Potential accident and malfunction incidents that might occur during construction that could affect the environment include:

- Accidental spills of toxic/hazardous materials (e.g., gasoline, diesel, propane, hydraulic oil, lubricating oils and greases, and concrete);
- Failure of sediment mitigation measures leading to sediment discharge; and
- Damage to utilities (e.g. buried natural gas pipes, buried high pressure water mains, and buried sanitary mains and telecommunication cables).

To minimize the impacts from accidents and malfunctions, it is recommended that the following contingency measures be developed and implemented.

#### 9.1.1 Spills of Toxic or Hazardous Materials

Toxic or hazardous materials accidentally released during construction (e.g. hydrocarbons and concrete), can be acutely or chronically toxic to aquatic and semi-aquatic life and associated food resources. A spill prevention and contingency plan should be in place, which would include:

- A description of pre-emergency planning including the identification of potential accidents and malfunctions, an estimate of the quantity of material that could be released during such an event, and an evaluation of the consequences;
- A terms of reference including site preparation activities, and types of potential emissions or spills into the environment (air, water, land) that may occur during these activities;
- Methods for the management and clean-up of toxic or hazardous spills; and
- Spill response equipment and manual to be stored on the job site.

Contractors working on the Project would be required to immediately report a spill of toxic or hazardous material verbally to the MoT representative for the Project, and the Provincial Emergency Program (PEP). The contractor would be required to take immediate steps to abate the emergency and provide labour, equipment, materials and absorbents to contain and remove the impacts, clean up the affected area, dispose of waste materials and absorbents to contain and remove the impacts, clean up the affected

area, dispose of waste material at an approved disposal site, and restore the areas to the satisfaction of the environmental regulatory agencies. To minimize the potential for contamination to soils, groundwater and surface water from accidental spills, the following BMPs should also be followed during all phases of the Project:

- Regular maintenance of all vehicles and equipment to be used within the Project area;
- Refueling of vehicles and equipment should take place a minimum of 30 m away from any watercourse and should be in an upland location; and,
- Equipment staging areas and storage areas should be at least 30 m away from any watercourse and should be on level ground.

### **9.1.2 Sediment Discharge**

The release of sediment can degrade water quality, and this can negatively affect the survival of fish and aquatic or semi-aquatic wildlife. High sediment loads will also damage irrigation and drainage equipment. Contingency measures to minimize accidental sediment releases that mitigation measures are unable to address include having sufficient materials such as clean rock, granular material, and filter fabric available on-site for emergency protection measures. Settling ponds should also be located and loaded 30 m away from surface water.

### **9.1.3 Damage to Utilities**

Damage to utilities including: buried gas pipelines, high pressure water mains, and overhead cables can be a safety hazard and cause temporary disruption to residents and businesses within the Project area. Identifying the location of utilities within the Project area before construction commences will minimize the risk of accidental damage to utilities. Contractor personnel responsible for managing incidents such as the discovery of unidentified utilities should be onsite, and will be required to know which utility company or regulatory agency will be contacted for response to particular incidents.

## **9.2 OPERATION**

The only potential for accidents and malfunctions to occur during the operations phase of the Project would be associated with maintenance activities. As such, the mitigation measures described above should be applied during maintenance activities associated with Project operations.

## **10.0 EFFECTS OF THE ENVIRONMENT ON THE PROJECT**

Various environment factors may result in changes to the Project, with the potential to cause damage or impact proper function of Project infrastructure. Some key potential environmental effects for this specific project include climate (including sea level) change, flooding and erosion. The text that follows provides a summary of these environmental factors, their potential effects, and any applicable mitigation measures that will be applied through the design and/or implementation phases of the Project.

### **10.1 CLIMATE CHANGE**

It is widely accepted in the scientific community that the increased production of greenhouse gases by human activities over the past few centuries has resulted in an increase in global temperatures. A general increase in global temperatures may result in sea level rise which would affect tides in the lower Fraser River. In addition, climate change may cause more severe weather conditions including more frequent and severe precipitation and/or drought events.

Given that climate change has the potential to impact the function of the DIEP project, it is recommended that designs for any new structures should include standards to account for the predicted changes in sea level that are the results of climate change (Auld *et al.* 2006).

### **10.2 FLOODING**

Flood hazards currently exist in association with the lower Fraser River and adjacent lowlands including those where the DIEP is situated. Weather conditions associated with climate change also have the potential to result in flooding. In particular, rising sea levels and increased precipitation in the winter and early spring in the Lower Mainland have the potential to impact existing flood protection work (i.e., Fraser River mainstem dykes and the dykes alongside Boundary Bay).

Designs for any new structures associated with DIEP will need to take potential flooding into account, including increased risk of flooding that might result from predicted changes in sea level caused by climate change (Auld *et al.* 2006).

Maintenance of dyke infrastructure within the Project area is a municipal responsibility. To maintain dyke integrity, the CoD oversees maintenance activities and construction where upgrades are required. These activities ensure that Delta's dyke network meets the Provincial Dyking Authority requirements which base the infrastructure standards to a one in 200 year event. In conjunction with CoD's ongoing activities to monitor and maintain the dyke network in Delta, additional activities will need to be applied to ensure the ongoing operation of the DIEP project is properly integrated with dyke infrastructure management.

### **10.3 EROSION**

Weather events may cause mobilization of erodible soils, resulting in negative impacts on watercourses and ditches associated with the DIEP project. Extreme weather events, including those anticipated to arise as a result of climate change, could lead to some areas of reduced channel bank integrity and surface water quality degradation. In addition, any increase deposition rates of fines within the irrigation system would result in maintenance activities being required on a more frequent basis. Although the channels and ditches associated with the DIEP project are relatively low gradient water features, ongoing monitoring of the irrigation network will need to be undertaken as part of the regular maintenance for the Project.

The environment has the potential for causing changes to the Project. As a result there is potential for damage to be caused to Project infrastructure, localized within the Project area. Some of the potential effects can include flooding and erosion, and climate change. A summary of the mitigation measures applied through the design process are listed within each subsection.

## 11.0 FOLLOW-UP

An Environmental Management Plan (EMP) should be developed for this Project. The purpose of the EMP is to:

- Ensure that commitments to minimized environmental impacts will be met;
- Provide clear and concise instructions to project personnel regarding procedures for protecting the environment and minimizing environmental impacts;
- Provide a reference document for personnel when planning and/or conducting specific activities (i.e. Sediment and erosion control); and,
- Follow guidelines as outlined in the Ministry of Environment's "Environmental Best Management Practices for Urban and Rural Land Development in British Columbia (2004)".

The EMP should be implemented by an on-site Environmental Monitor for proposed construction and should include:

- The monitoring of daily construction activities and the documentation of environmental concerns and mitigation measures undertaken. Monitoring of the Project should be expected to be conducted at a full-time and part-time level (depending on the Project component);
- The completion of daily monitoring reports, the completion of incident reports, photo-documentation of construction works;
- Provisions should be made to provide appropriate training on environmental monitoring of construction works to on-site personnel. An on-site meeting and review of the EMP should be held with on-site contractor and/or construction supervisor;
- The construction supervisor should be involved in the implementation of sediment and erosion control measures, and environmental protection. The construction supervisor will also be responsible for daily, weekly, and monthly monitoring and documentation of operations;
- Protocols for the management of suspected contaminated soil (if encountered), which would include safe handling, temporary storage (stockpiling), characterization, transportation and disposal;
- Protocols for management of discharge and run-off to ditches; and,
- Environmental staff will co-ordinate and complete the production of monthly monitoring reports and a final project monitoring report.

The contractor and environmental professional will prepare a Project-specific Health and Safety Plan. All employees working on the site will be suitably trained and experienced and will fully comply with all federal and provincial health and safety standards.

## 12.0 CONCLUSIONS

This CEAA screening report has identified the potential environmental and socio-economic interactions associated with the Project, and has recommended mitigation measures to avoid or minimize the identified potential impacts. The Project is expected to result in enhancements to fish habitat and access, land use (irrigation and agriculture), and navigable waters (access). The purpose of the Project is to offset potential impacts to local irrigation within south-west Delta, and the irrigation enhancements discussed in this report present opportunities to optimize agricultural/economic potential while also providing fish and fish habitat benefits through improved water quality and access.

As determined through this report, residual adverse impacts to the environmental and socio-economic values are not expected with the implementation of the mitigation and management measures discussed. It is expected that the potential effects of the Project can be effectively addressed through the application of BMPs and proposed mitigation measures, and where necessary, compensation measures (i.e. fisheries). As such, significant adverse environmental or social effects are not expected as a result of the Project.

Report prepared by:  
**Hemmera**



Lori Leach, B.Sc.  
Environmental Specialist  
604.669.0424 (130)  
lleach@hemmera.com

Report peer reviewed by:  
**Hemmera**



Jim Roberts  
Project Manager  
604.669.0424 (229)  
jroberts@hemmera.com

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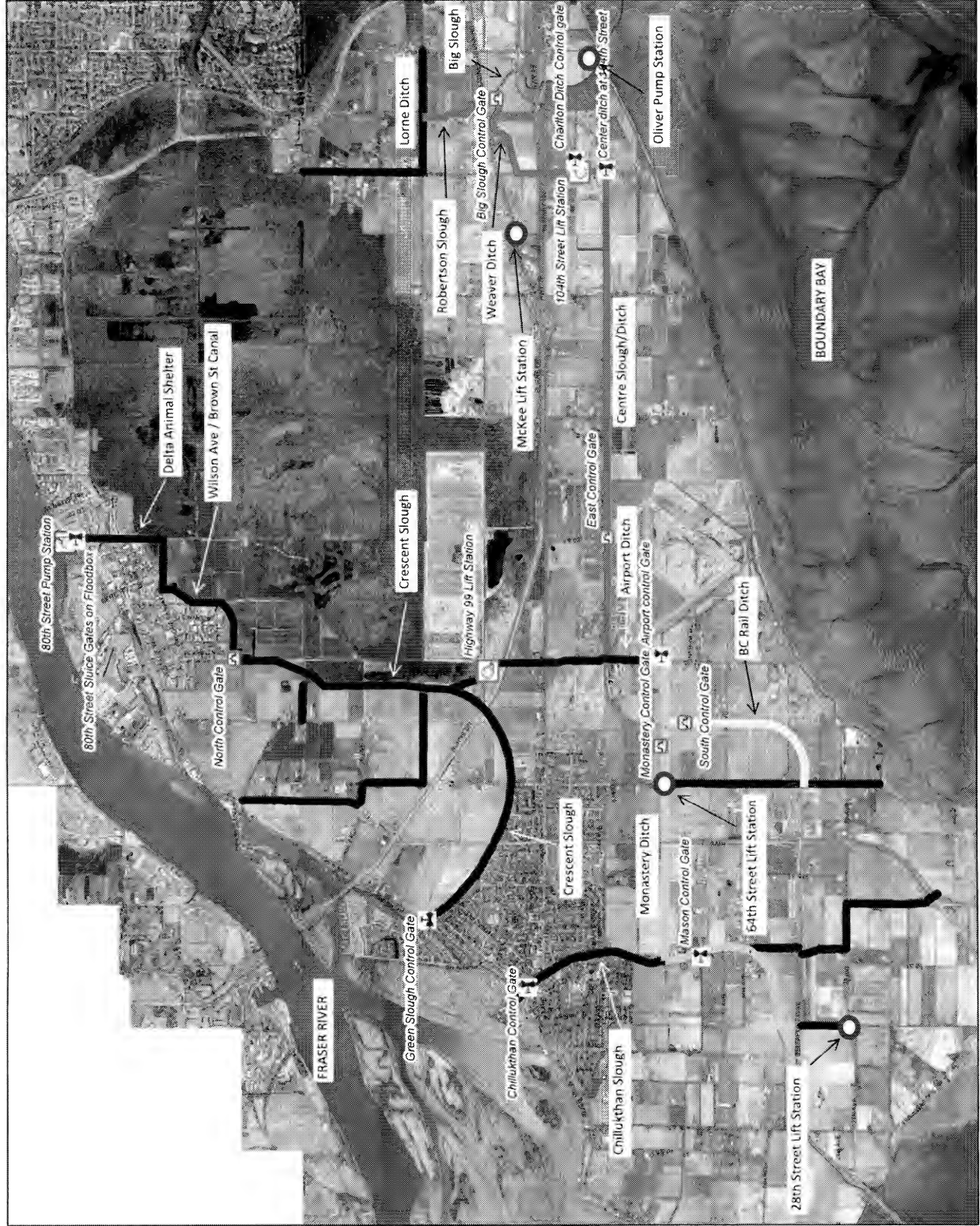
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## **FIGURE 1**



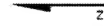
- Irrigation Controls**
- Lift Station
  - Pump Station
  - Control Gate
  - Automated Control Gate
  - Existing Delta Ditches

**PRIMARY NETWORK ENHANCEMENTS:**

- NORTH DITCH
- EAST DITCH
- WEST DITCH
- SOUTH DITCH

**SECONDARY NETWORK ENHANCEMENTS:**

- 



**FOR DISCUSSION ONLY**

**EXHIBIT PDR-00  
PROJECT DEFINITION MAP**

Delta Irrigation Enhancement Project  
January 29, 2010  
South Fraser Perimeter Road  
Project No. LITM 2009 10 045001

## **SITE PHOTOGRAPHS**



**Photo 1:** NORTH DITCH: 80<sup>th</sup> Street Ditch – East, at Progress Way, looking north (downstream) – photo taken on November 19, 2008



**Photo 2:** NORTH DITCH: 80<sup>th</sup> Street Ditch – East, at Progress Way, looking south (upstream) – photo taken on November 19, 2008



**Photo 3:** NORTH DITCH: 80<sup>th</sup> Street at River Road



**Photo 4:** SOUTH DITCH: Crescent Slough looking upstream (north) – photo taken on November 19, 2008





**Photo 5:** SOUTH DITCH: Crescent Slough looking downstream (south) – photo taken on November 19, 2008



**Photo 6:** SOUTH DITCH: Hamming's Ditch, looking north (downstream) at portion of ditch to be redirected to the west – photo taken on November 19, 2009

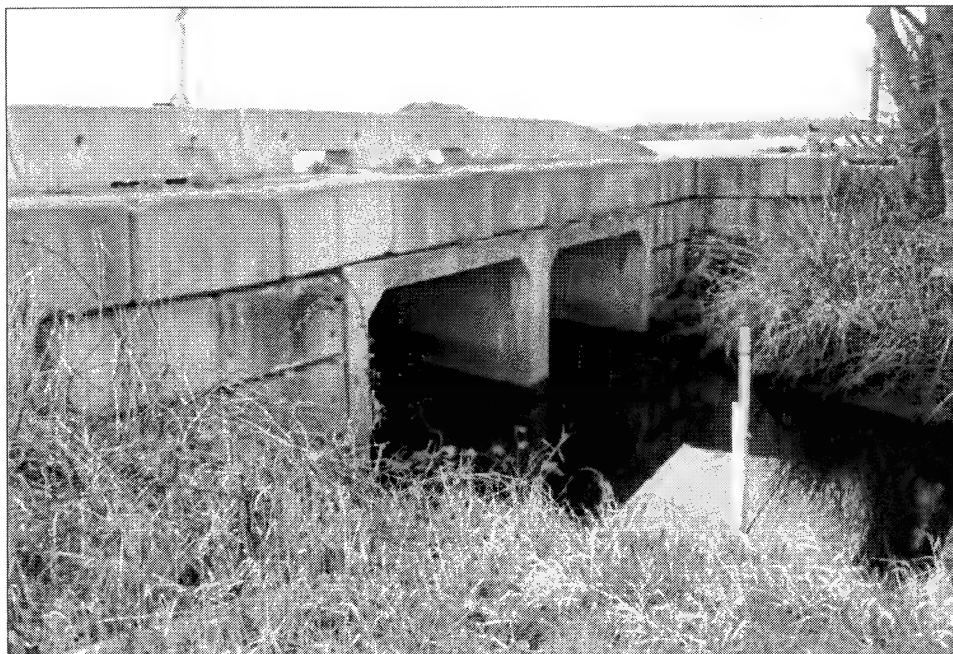


**Photo 7:** SOUTH DITCH: Hamming's Ditch, looking north (downstream) of the proposed point of reconnection to Crescent Slough (just south of photo) – photo taken on November 19, 2009



**Photo 8:** EAST DITCH: Big Slough at Ladner Trunk Road (view facing north)

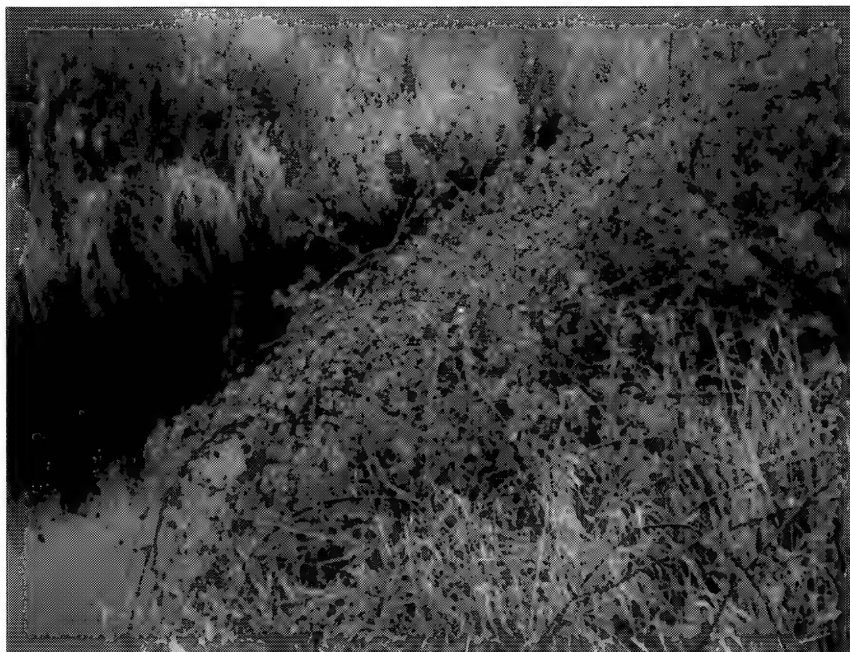




**Photo 9:** EAST DITCH: Big Slough at Ladner Trunk Road (view facing west)



**Photo 10:** EAST DITCH: Big Slough at Ladner Trunk Road (view facing north)



**Photo 11:** EAST DITCH: Big Slough south of Ladner Trunk Road (Note dominance of invasive species in riparian habitat.)



**Photo 12:** EAST DITCH: 104<sup>th</sup> Street Ditch at Hornby Drive (dry at time of site visit, February 23, 2010)



**Photo 13:** EAST DITCH: 104<sup>th</sup> Street Ditch at Hornby Street (view facing south)



**Photo 14:** EAST DITCH: Centre Slough at 104<sup>th</sup> Street (view facing west) – typical East Ditch riparian (i.e., bounded by agricultural lands to south and by rail line to north)





**Photo 15:** EAST DITCH: Centre Slough at 96<sup>th</sup> Street (view facing west)



**Photo 16:** EAST DITCH: Centre Slough at 88<sup>th</sup> Street (view facing east)



**Photo 17a:** EAST DITCH: Flapgate and pumphouse (Centre Slough between 88<sup>th</sup> and 80<sup>th</sup> Street)



**Photo 17b:** EAST DITCH: Flapgate and pumphouse (Centre Slough between 88<sup>th</sup> and 80<sup>th</sup> Street)



**Photo 18:** EAST DITCH: Centre Slough at 80<sup>th</sup> Street (view facing east) – note closed flapgate



**Photo 19:** WEST DITCH: Chillukthan Slough at Arthur Drive (view facing west)

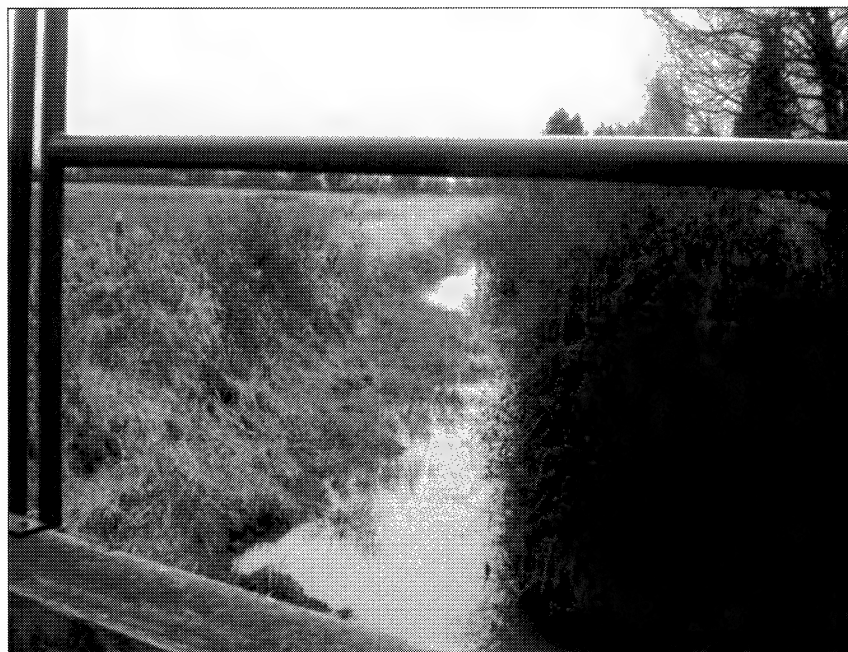


**Photo 20:** WEST DITCH: Chillukthan Slough at Arthur Drive (view facing east)



**Photo 21:** WEST DITCH: Chillukthan Slough at Arthur Drive (Note low water levels and poor water quality appearance.)





**Photo 22:** WEST DITCH: Chillukthan Slough north of 36<sup>th</sup> Avenue (view facing south)



**APPENDIX A**  
**South Fraser Perimeter Road**  
**Terms of Commitments and Assurances**

# **OWNER'S TABLE OF COMMITMENTS AND ASSURANCES**

**June 20, 2008**

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## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES - June 20, 2008

### SOUTH FRASER PERIMETER ROAD PROJECT: OWNER'S TABLE OF COMMITMENTS AND ASSURANCES<sup>1</sup>

Ref	Objective Commitments and Assurances	Timing	Delivered By
<b>1.0</b>	<b>Responsible Environmental Management</b>		
1.1	<p>Develop, implement and maintain an Environmental Management Plan (EMP) for the Project to demonstrate how the design, construction and operation, including maintenance, of the Project:</p> <ul style="list-style-type: none"> <li>• Will be carried out to avoid or mitigate negative impacts;</li> <li>• Will be carried out in an environmentally responsible manner, in accordance with MOT Specifications for Protection of the Environment (DB SS165)<sup>2</sup>;</li> <li>• Will employ Best Management Practices (BMPs<sup>3</sup>); and</li> <li>• Will comply with federal and provincial legislation, permits, approvals and authorizations, including the Environmental Assessment Certificate (EAC).</li> </ul>	All phases	Contractor
1.2	Prepare and implement a Construction Environmental Management Plan (CEMP), (which is a component of the EMP) <sup>4</sup> , including relevant sub-plans, for the Project prior to the start of relevant construction activities.	Pre-construction	Contractor
1.3	Obtain required statutory permits, approvals, and authorizations before proceeding with construction that requires such permits.	All phases	Contractor
1.4	Adhere to the terms and conditions of the: EAC; federal screening report; the EMP; MOT specifications Section 165, Protection of the Environment; and any other applicable permits, licenses and approvals.	Pre-construction, Construction	Contractor

<sup>1</sup> The "Owner" is understood to mean the applicant for an environmental assessment certificate pursuant to BCEAA (i.e MoT) and to whom the Certificate may be issued. Any transfer of commitments and assurances in this *Appendix E* by the applicant to the selected Contractor, must comply with all conditions of the Certificate. A full transfer of the Certificate and its conditions to the Contractor - as the new "Owner" - requires a name change for the holder of the Certificate and necessitates an Amendment to the Certificate.

<sup>2</sup> Should there be a conflict between the DBSS165 and these commitments, the more stringent environmental protection measure will apply.

<sup>3</sup> Those that are technically and economically feasible and as defined specifically in other sections of this Table.

<sup>4</sup> As discussed in section 11 of the EA Application.

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
1.5	<p>Establish an Inter-Agency Environmental Review Committee (IAERC), in accordance with the Terms of Reference developed during Application review, to provide for agency review and comment on plans and designs prior to construction, including but not limited to:</p> <ul style="list-style-type: none"> <li>• Detailed design of stormwater management infrastructure;</li> <li>• Detailed vegetation and wildlife mitigation plans and mitigation monitoring plans; and</li> <li>• Environmental management plans.</li> </ul>	Pre-construction, construction	MOT/Contractor
1.6	<p>Provide all project related EMPs, including component EMPs, to applicable regulatory agencies in the IAERC for review and comment, at least 30 calendar days prior to the start of construction that requires such plans.</p>	Pre-construction	Contractor
1.7	<p>Relevant sub-plans to be included in the CEMP will include those to address environmental issues identified in the Application and supporting documentation submitted to the EAO during the Application review, and described in the Application (Section 11, pg. 523), including but not limited to:</p> <ul style="list-style-type: none"> <li>• Agriculture Mitigation Plan;</li> <li>• Air Quality and Dust Control Plan;</li> <li>• Archaeological Mitigation / Monitoring Plan;</li> <li>• Construction and Hazardous Waste Management Plan;</li> <li>• Contaminated Sites Management Plan;</li> <li>• Contractor Awareness and Education Plan;</li> <li>• Environmental Monitoring Plan;</li> <li>• Fisheries Habitat Mitigation and Compensation Plan;</li> <li>• Health and Safety Plan;</li> <li>• Invasive Species Management Plan;</li> <li>• Noise and Vibration Management Plan;</li> <li>• Spill Management and Emergency Response Plan;</li> <li>• Surface Water Quality and Sediment Control Plan;</li> <li>• Wildlife and Habitat Management Plan..</li> </ul>	Pre-construction	Contractor
1.8	<p>Manage contamination encountered during project development, regardless of the current assessment of potential contamination, in accordance with applicable regulatory requirements.</p>	All phases	Contractor

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
1.9	Prepare and implement an Operational Environmental Management Plan, prior to operation and maintenance activities. Provide the operational EMP to relevant reviewing and regulatory agencies, for review and comment, at least 30 calendar days prior to the onset of operation and maintenance activities.	Pre-construction	Contractor
1.10	At a minimum, review the Wildlife and Habitat Management Plan and modify if required, three years post-construction and make a decision regarding the next review date and/or determine the closure date for the plan(s). The method for review, modification, and decision on closure of the plan(s) will be defined by the applicable regulatory agencies within the IAERC.	Operations	Contractor
<b>2.0 Monitoring</b>			
2.1	Ensure that environmental monitoring and reporting for the Project will be conducted, with respect to the terms and conditions of the EAC and other regulatory permits, approvals and authorizations as applicable.	Construction	Contractor
2.2	Incorporate a monitoring component into all applicable sub-plans of the construction EMP developed for the construction phase of the Project.	Pre-construction	Contractor
2.3	Outline in each of the sub-plans of the construction EMP: <ul style="list-style-type: none"> <li>• Rationale for monitoring;</li> <li>• Parameters to be monitored;</li> <li>• Monitoring program details; and</li> <li>• Required follow-up actions.</li> </ul>	Pre-construction	Contractor
2.4	The Owner will engage an Environmental Monitor for the construction phases of the Project to undertake environmental monitoring activities and oversee implementation of each of component plans of the EMP developed for the Project. The Environmental Monitor will monitor, evaluate, and report to the owner on construction activities and the effectiveness of the environmental management strategies and mitigation measures, with respect to the terms and conditions of the Application and other regulatory Permits, Approvals and Authorizations that may apply. The Monitor will be responsible for making on-site decisions and taking on-site action to avoid/respond to potential environmental effects which could include temporary stop work orders if necessary.	Construction	Contractor

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
2.5	Implement environmental quality management program through monitoring, auditing and reporting activities for the Project with respect to the terms and conditions of the EAC and other regulatory permits, approvals and authorizations.	All phases	Contractor
<b>3.0</b>	<b>Incident Management</b>		
3.1	Respond to environmental incidents, including spill incidents in accordance with the Emergency Response, Plan to minimize effects and risks to the general public, on-site workers and the environment.	All phases	Contractor
3.2	Include protocols, consistent with the BC Spill Reporting Regulation, for reporting spills to appropriate emergency response authorities, including; <ul style="list-style-type: none"> <li>The Provincial Emergency Program, in the case of any spills of reportable deleterious substances into waters frequented by fish, regardless of the amount of the spill; and</li> <li>To adjacent property owners and occupiers, including local government, where utilities cross the highway and there is a potential for an incident to extend beyond the Project boundaries.</li> </ul>	Pre-construction	Contractor
3.3	Train all field Project personnel regarding implementation of the Construction and Hazardous Waste Management and Spill Management and Emergency Response Plans.	All phases	Contractor
3.4	Incorporate relevant municipal contacts into the emergency contacts for the Construction and Hazardous Waste Management and Spill Management and Emergency Response Plans prepared for construction of the Project.	Pre-construction	Contractor
3.5	Follow applicable MOT standard specifications and Canadian Council of Ministers of Environment codes and procedures if temporary fuel storage/fuelling facilities are required during construction. Where there is a difference in standards, the most stringent measure for environmental protection will take precedence.	Construction	Contractor
<b>4.0</b>	<b>Community Consultation</b>		
4.1	Consult with local governments, stakeholders and the public during all stages of Project development.	Pre-construction, Construction	MoT, Contractor
4.2	Conduct community open houses and information sessions during the design review stage to obtain input on design refinements, during the preliminary and final design review stages.	Pre-construction,	MoT, Contractor

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
4.3	Provide regular public information updates on the progress of construction, the schedule, and upcoming milestones.	Construction	MoT, Contractor
4.4	Consult with the Corporation of Delta (CoD) and the City of Surrey (CoS) during all stages of project development and construction.	Pre-construction, Construction	Contractor
4.5	Provide updated media information materials, as part of the Project commitment to making project information available to the public.	All phases	Contractor
4.6	Track project enquiries and responses.	All phases	Contractor
4.7	Discuss potential economic opportunities generated by the Project with participating First Nations throughout the Post-EA Certification, Design and Construction Phases of the Project.	Pre-construction, Construction	MoT, Contractor
4.8	Obtain input from participating First Nations to identify appropriate measures to mitigate potential project related impacts on their previously identified interests in relation to fisheries and habitat matters.	Pre-construction	Contractor
<b>5.0 Stormwater Management</b>			
5.1	Ensure that the design, construction and maintenance of stormwater management infrastructure for the Project takes an integrated approach to stormwater management and contributes to maintaining, or improving, drainage and water quality conditions directly adjacent to the corridor.	All phases	Contractor
5.2	Design, construct and maintain stormwater management infrastructure, such that it to meets the performance objectives outlined in the Stormwater Management Plan Outline (July, 2007) and the Application. Monitoring of the infrastructure will be undertaken to confirm performance objectives are met or, if necessary, additional steps are taken to ensure performance objectives are achieved.	All phases	Contractor
5.3	Consult with municipalities adjacent to the new construction area such that the approach to the management of stormwater and drainage design is complementary to, and can be integrated with, adjacent municipal stormwater infrastructure.	Pre-construction	Contractor

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
5.4	Provide final designs for stormwater management infrastructure to relevant First Nations and reviewing and regulatory agencies for review and comment at least 30 calendar days prior to relevant construction activities in order to verify that the proposed infrastructure achieves agreed upon performance measures identified in the Stormwater Management Plan Outline (July 2007).	Pre-construction	Contractor
5.5	Drain stormwater and road runoff away from red and blue listed plant communities and do not construct integrated stormwater management infrastructure in such habitat areas.	Construction, Operation	Contractor
5.6	Obtain input from participating First Nations regarding mitigation measures outlined in the stormwater and drainage plan and effective integration of those measures into the design and operation of the Project.	Pre-construction	Contractor
<b>6.0 Agriculture</b>			
6.1	Consult with the Agricultural Land Commission (ALC), Ministry of Agriculture and Lands (MAL), Delta Farmers' Institute (DFI), individual farm owners and the CoD, through all future stages of Project development, construction and operation, to ensure impacts to agricultural lands and operations are minimized where possible and appropriately addressed where impacts are unavoidable.	All phases	MoT, Contractor
6.2	Obtain ALC approvals regarding areas within the Agricultural Land Reserve (ALR) required for the project, prior to construction.	Pre-construction	MoT, Contractor
6.3	Develop and implement an Agricultural Mitigation Plan as outlined in the Application that identifies potential impacts to agriculture as a result of project construction activities and measures for avoiding and addressing such impacts where possible. The scope will include those measures outlined in the Application and the Agricultural Enhancement Strategy (April 2008), including but not limited to mitigation measures focused on: <ul style="list-style-type: none"> <li>• Road access;</li> <li>• Drainage and irrigation;</li> <li>• Utilities; and</li> <li>• Maintaining the agricultural land base.</li> </ul>	Pre-construction	Contractor



## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
6.4	Finalize and implement specific agricultural enhancement initiatives, including but not limited to, compensation mechanisms focused on improving road access and drainage and irrigation, as part of the application process to the ALC and summarily as part of the Agricultural Enhancement Strategy (April 2008).	Pre-construction, Construction	MoT
6.5	Retain the services of a Professional Agrologist to: <ul style="list-style-type: none"> <li>• Liase with the owner, contractor and farmer(s);</li> <li>• Oversee a consultation and dispute resolution process for individual farmers affected by the Project; and</li> <li>• Oversee monitoring and effectiveness of measures proposed to address impacts to agriculture during design, construction and operation.</li> </ul>	All phases	MoT
6.6	Avoid, to the extent possible, using agricultural lands outside of the Right-Of-Way (ROW), for staging areas. For all agricultural lands that are required for use as staging areas, implement construction BMPs (as noted in the Agriculture Mitigation Plan in the EMP) to manage potential construction related effects and restore lands to pre-construction condition, or better agricultural capability, upon completion of project works.	Pre-construction, Construction	Contractor
6.7	Consult with individual farm owners, as well as MAL, ALC, CoD, DFI and other stakeholders, to identify potential impacts to agricultural operations and infrastructure and ensure that such impacts are avoided, mitigated for, or appropriately addressed during future stages of design and construction of the Project. The scope of potential impacts to farm operations includes, but is not limited to: <ul style="list-style-type: none"> <li>• Agricultural drainage;</li> <li>• Utilities;</li> <li>• Road Access; and</li> <li>• Pollinators.</li> </ul>	Pre-construction, Construction	MoT, Contractor
6.8	Undertake reasonable measure to facilitate the consolidation of parcels of isolated agricultural lands, to promote continued agricultural use of such lands.	All phases	MoT
6.9	Undertake reasonable measures to minimize potential loss of ALR lands, including existing farm(s) by: <ul style="list-style-type: none"> <li>• Refining the Project footprint where feasible; and</li> <li>• Optimizing use of existing ROW.</li> </ul>	Pre-construction, Construction	Contractor

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
<b>7.0 Air Quality</b>			
7.1	Ensure that the construction works and operations for the Project are conducted in compliance with environmental permits and approvals and that all reasonable measures are taken to address project-related effects on air quality.	Construction, Operation	Contractor
7.2	<p>Develop and implement an Air Quality and Dust Control Plan for the construction phase of the project. The plan will:</p> <ul style="list-style-type: none"> <li>• Include an air quality monitoring program with thresholds, which if exceeded, will trigger the implementation of additional mitigation and corrective measures;</li> <li>• Commit to the best available, known and effective, measures for mitigating construction related air emissions, including diesel particulate matter (PM), as identified by relevant regulatory agencies. This would include, where practical, the use of diesel oxidation catalysts (DOCs) or diesel particulate filters (DPFs) on all on-road and off-road project equipment in combination with use of a B20 biodiesel blend;</li> <li>• Include an anti-idling policy for construction equipment and other vehicles associated with construction related activities;</li> <li>• Commit to fugitive dust minimization strategies (e.g., wheel wash and sweeping), and dust suppression techniques (e.g. watering) on roads; and</li> <li>• Identify site specific considerations, where applicable, such as proximity to sensitive environmental or human receptors.</li> </ul>	Pre-construction, Construction	Contractor
7.3	Provide the Air Quality and Dust Control Plan to Metro Vancouver, Environment Canada (EC), Ministry of Environment (MoE), Transport Canada, Health Canada (HC) and other relevant agencies for review and comment at least 30 calendar days prior to relevant construction activities.	Pre-construction	MoT, Contractor
7.4	Avoid burning as a means for disposing of land clearing debris.	Construction	Contractor
<b>8.0 Traffic Management</b>			
8.1	Ensure that the design of the Project is integrated with local road networks, and that construction of the proposed project includes measures for avoiding or minimizing impacts to local road networks		MoT, Contractor

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
8.2	Prepare and implement a Traffic Management Plan in co-ordination with CoS and CoD to address construction related traffic conditions.	Pre-construction, Construction	Contractor
8.3	Consult with the CoD, CoS, MoT district office, and other stakeholders to design and construct project infrastructure so that it is effectively integrated with existing and planned local road networks.	Pre-construction, Construction	Contractor
<b>9.0 Noise and Vibration</b>			
9.1	Ensure that potential noise impacts associated with the project are considered and mitigation provided for during design, construction and operation of the project.	All phases	Contractor
9.2	Prepare and implement a Noise and Vibration Management Plan for the construction phase of the Project that will include specific mitigation measures, and locations where they will be applied to address construction related noise.	Pre-construction, Construction	Contractor
9.3	Prepare a noise complaint protocol as part of the CEMP Noise and Vibration Management Plan to respond in a timely manner to concerns and complaints raised by residents and take reasonable actions to reduce the Project-related construction noise in question.	Pre-construction	Contractor
9.4	Provide the construction Noise and Vibration Management Plan to the CoS, CoD and other stakeholders for review and comment 30 calendar days prior to the onset of relevant construction activities.	Pre-construction	Contractor
9.5	Design and construct mitigation measures to address potential operational noise impacts on residential areas as part of the project according to the MoT Noise Policy (1993).	Pre-construction, Construction	Contractor
9.6	Conduct noise monitoring at the baseline sites during the first year after construction is complete to assess the effectiveness of mitigation measures, with a commitment to further mitigation if necessary, technically feasible and practical.	Operation	Contractor
9.7	Consult with the CoD and CoS to look for opportunities to use tree planting and landscaping to mitigate potential visual, noise and air quality impacts.	Pre-construction, Construction	Contractor
9.8	Participate in meetings with affected communities and residents to address site-specific noise issues in the event that late evening or night time construction works prove necessary in the vicinity of residential areas.	Pre-construction, Construction	Contractor

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
9.9	Perform pre-condition surveys to document existing state of buildings and facilities in the vicinity of SFPR construction activities as per standard geotechnical BMPs. This will form the baseline conditions, against which post-construction condition surveys will be carried out to assess any vibration impacts to buildings and facilities as a result of Project construction.	Pre-construction	Contractor
9.10	Monitor ground vibrations, as per standard geotechnical BMPs, adjacent to buildings to confirm that vibration levels are within ranges expected to avoid construction-related vibration.	Construction	Contractor
<b>10.0 Contaminated Sites and Property Acquisition</b>			
10.1	Ensure that potential site contamination is investigated, and managed in compliance with the Contaminated Sites Regulation (Environmental Management Act), during all stages of project development including property acquisition, design and construction		Contractor
10.2	Assess all Tier 1 and Tier 2 properties required for the ROW for potential contamination prior to construction and take steps, as required, to investigate and address site contamination that may exist.	Pre-construction, Construction	MoT, Contractor
10.3	Manage any contaminated groundwater encountered in accordance with the requirements of the <i>Environmental Management Act</i> and associated regulations.	Pre-construction, Construction	MoT, Contractor
10.4	Undertake risk assessment and remediation activities, as required, and manage potential contamination in compliance with the provincial <i>Environmental Management Act</i> and Contaminated Sites Regulation.	Pre-construction, Construction	MoT, Contractor
10.5	Should contaminated groundwater be identified along the route, include measures to control/mitigate the potential for impacts to surface water in future stormwater design.	All phases	MoT, Contractor
10.6	Notify MoE of potential migration of contaminants from known or identified Tier 1 off-corridor properties of concern discovered during supplementary investigations or Project-related activities and use information to manage and mitigate contaminated sites issues prior to construction.	Pre-construction	Contractor

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
10.7	As part of the CEMP, the Contaminated Sites Management, Construction and Hazardous Waste Management and Spill Management and Emergency Response Plans, develop and implement a protocol for identifying and managing contaminated and potentially contaminated materials during the construction phase of the Project.	Pre-construction, Construction	Contractor
<b>11.0</b>	<b>Fisheries</b>		
11.1	Ensure that all works and activities associated with the construction, operation and maintenance of the project are conducted in compliance with the <i>Fisheries Act</i> . This includes implementing mitigation measures and best management practices to ensure that the project does not cause any unauthorized harmful alteration, disruption or destruction of fish habitat, that the project does not cause any harm or mortality to fish, and that the project does not cause or result in the deposit of a deleterious substance of any type, including sediment, into a watercourse that is frequented by fish.	All phases	Contractor
11.2	Obtain an authorization under subsection 35(2) of the <i>Fisheries Act</i> for any unavoidable harmful alteration, disruption or destruction of fish habitat prior to relevant construction works or activities	All phases	Contractor
11.3	Develop and construct fish habitat compensation measures that offset all project impacts to fish habitat. These fish habitat compensation measures will be constructed by the proponent as directed by Fisheries and Oceans Canada and in accordance with any s. 35(2) <i>Fisheries Act</i> authorizations.	Pre-construction, Construction	Contractor
11.4	Implement appropriate measures to adequately mitigate the effects of the creation of impervious surfaces on volume of surface runoff, rate of runoff, and water quality. These will meet performance targets established in the Stormwater Management Plan Outline (July, 2007) for the project.	Pre-construction, construction, operation	Contractor
11.5	Establish and maintain riparian setback areas from drainage channels and watercourses in accordance with regulatory requirements	Pre-construction, construction, Operation	Contractor
11.6	Take all reasonable measures to prevent substances that may be harmful to fish from entering the aquatic environment at the construction sites in the proximity to fish and aquatic habitat, paying particular attention to discharges of suspended sediments, construction waste, handling of uncured concrete and other deleterious substances.	Construction	Contractor

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
11.7	Construct bridges for watercourse crosses in the vicinity of Delta Ravines (i.e. Norum , McAdam, Collings, Nelson View and Gunderson Creeks), as shown in plans attached to the Application (Technical Volume 1) and over a minimum 450 m portion of the Fraser Heights Wetlands, using the design and the construction methods outlined in the draft Fraser Heights Wetlands Bridge Preliminary Design Report.	Pre-construction, construction	Contractor
11.8	Obtain input from the Musqueam Indian Band and other participating First Nations to identify appropriate measures to mitigate potential project related impacts on the identified interests of the Musqueam Band in relation to fisheries and habitat matters. Identify potential opportunities for mutually agreeable opportunities to assist in advancing the fisheries interests of the Musqueam Indian Band or other participating First Nations..	All phases	MoT, Contractor
11.9	Review with the applicable regulatory agencies, including but not limited to DFO and MOE, proposals for compensation habitat, including opportunities for habitat to be constructed in advance of other Project construction (i.e. "habitat banking"), to determine the ratio of habitat types and to which drainage compensation will apply.	Pre-construction	Contractor
11.10	Follow BMPs in the construction of all new ditches and stormwater watercourses.	Construction	Contractor
11.11	Retain maintenance responsibility for compensation sites within the Project limits. For sites constructed in areas outside of the Project limits, establish site-specific agreements for access and maintenance with the relevant stakeholder/landowner.	Operations	Contractor
<b>12.0</b>	<b>Water Quality</b>		
12.1	Ensure that the construction works and operations for the Project are conducted in compliance with environmental requirements and BMPs in order to avoid impacts to water quality.	All phases	Contractor
12.2	Develop and implement a Surface Water Quality and Sediment Control Plan and provide the plan for review and comment by relevant environmental agencies at least 30 calendar days prior to the start of relevant construction activities.	Pre-construction	Contractor

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
12.3	Sample water from potentially impacted drinking water wells to assess potential adverse effects to water quality associated with during construction and operation phases of the project. Provide sampling water quality data to the local health authority for review and comment.	Construction, Operation	Contractor
12.4	<p>The Surface Water Quality and Sediment Control Plan will at a minimum:</p> <ul style="list-style-type: none"> <li>• Identify requirements for additional water quality monitoring prior to and during construction to ensure preventative and mitigation measures can be taken as appropriate, to avoid impacts to water quality;</li> <li>• Identify potential water quality contaminants of concern generated by construction activities and associated preventative and mitigative measures;</li> <li>• Include a BMP maintenance plan to ensure BMPs implemented are functioning as designed and corrective actions are taken when required; and</li> <li>• Be submitted to the applicable regulatory agencies at least 30 calendar days prior to start of construction activities for review.</li> </ul>	Pre-construction, Construction	Contractor
<b>13.0 Wildlife and Vegetation</b>			
13.1	Ensure that the design, construction, and operation of the project, avoids where practical and technically feasible, impacts to vegetation and wildlife.	All phases	Contractor
13.2	Prepare and implement a Wildlife and Habitat Management Plan to avoid and, where necessary, mitigate potential impacts to vegetation, wildlife and wildlife habitat. Provide the Plan to relevant regulatory and reviewing agencies for review and comment at least 30 calendar days prior to relevant construction activities beginning. The Wildlife and Habitat Management Plan will include best practices including but not limited to those identified in the Application (Table 7.7-17), draft Wildlife Mitigation Crossing Plan (April 2007), and Zones of Influence memo (July 2007) in order to avoid, and where necessary, mitigate potential effects on vegetation and wildlife. This plan will also identify protocols for the survey and salvage of vegetation and wildlife as appropriate and required.	Pre-construction, Construction	Contractor
13.3	Develop and implement mitigation measures to avoid and minimize impacts to wildlife during construction and operation of the project including, but not limited to those measures identified in the Application (September, 2006), draft Wildlife Mitigation Crossing Plan (April 2007) and Zones of Influence Assessment memo (July 2007).	Pre-construction, Construction	Contractor

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
13.4	During the design phase, the MoT will finalize its determination of the type and location of sound barriers to be constructed along the perimeter of Burns Bog. For the south-western alignment (adjacent to Crescent Slough), this design will include the construction of a solid sound barrier or a barrier that will provide equivalent mitigation. MoT will ensure on-going consultation with TC, EC, MoE and other IAERC members as appropriate, during design regarding the proposed type and location of sound barriers to be installed around Burns Bog	Pre-construction	MoT, Contractor
13.5	Consult with the MoE and the Canadian Wildlife Service (CWS) of Environment Canada, to identify suitable compensation, including but not limited to that identified in the Wildlife and Habitat Management Plan and Habitat Compensation Plan (February, 2007), to address residual effects on vegetation and wildlife as a result of the Project.	Pre-construction	Contractor
13.6	<p>Work with reviewing and regulatory agencies to develop and implement a comprehensive and long term Mitigation Monitoring Plan (MMP), based on the Vegetation and Wildlife Mitigation Monitoring Strategy (April 2007), to monitor the effectiveness of proposed mitigation measures in addressing Project-related effects on vegetation and wildlife, including species at risk.</p> <p>Data collection and monitoring in support of the implementation of the MMP will begin prior to construction and continue for a period of time, to be determined with relevant regulatory agencies, during operation. Information collected in relation to the MMP will be used to guide detailed planning of mitigation, assess the effectiveness of such mitigation, and determine where additional measures may be required.</p> <p>The MMP will include scientifically defensible thresholds or performance measures to facilitate the evaluation of the effectiveness of mitigation.</p>	All phases	Contractor
13.7	Undertake site-specific vegetation surveys in accordance with the regionally supported <i>Protocols for Rare Plants Surveys</i> , to identify the presence and distribution of red- and blue-listed plants species prior to final design and construction. Provide information on the presence and distribution of such plants species to MoE for review and use the information to guide final design and construction to avoid or mitigate impacts to these species.	Pre-construction	Contractor



## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
13.8	Avoid direct impacts to sensitive red and blue listed plant communities where possible and adhere to construction exclusion windows determined by regulators.	Construction	Contractor
13.9	Develop a plan for salvaging plants and seeds, for review by MoE, where impacts to red and blue listed plant species cannot be avoided, for replanting off-alignment.	Pre-construction	Contractor
13.10	Make all reasonable efforts to avoid impacts to confirmed streambank lupine habitat and confirmed stream bank lupine seed banks in the project corridor, as identified in consultation with the Streambank lupine recovery team, during design construction and operation of the Project. Where impacts to such areas cannot be avoided, work with the Ministry of Environment and the Streambank Lupine Recovery team to identify and carry out appropriate mitigation measures including, but not limited to, the stockpiling of soil containing streambank lupine seeds.	Construction	Contractor
13.11	<p>Undertake pre-construction bird nest surveys and restrict clearing during the breeding season. Pre-construction bird nest surveys will include, but not necessarily be limited to the following:</p> <ul style="list-style-type: none"> <li>• Conduct pre-construction raptor, heron or any listed species nest and roost tree surveys, consistent with applicable BMPs, to determine presence of active/inactive raptor and heron nests in the corridor and work scheduling with respect to the nest locations and applicable timing restrictions.</li> <li>• Prepare pre-construction bird nest survey protocols should works include clearing of vegetation during the general bird breeding time period as determined by MOE.</li> <li>• Conduct pre-construction bird nest surveys to the satisfaction of the MOE should the Contractor intend to seek approval from the MOE for vegetation clearing within the bird breeding time period (defined by MOE) in any year during the Contract Period.</li> </ul>	Pre-construction	Contractor
13.12	Consult with MoE on the development and implementation of an Invasive Species Management Plan to address potential effects of the project related to the spread of invasive plant and aquatic wildlife species within the project corridor.	Pre-construction, Construction	Contractor

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
13.13	Include large mammal crossings adjacent to the perimeter of Burns Bog. The final number and location of wildlife crossings will be identified in the Wildlife Mitigation Crossing Plan, which will be finalized in consultation with MoE and EC.	Pre-construction	Contractor
13.14	Follow the design criteria outlined in the MOT Manual of Aesthetic Design Practice and the MOT Landscape Policy and Design Standards that form the landscape and site restoration design criteria for the Project.	Pre-construction, Construction	Contractor
13.15	Use data collected through the MOT administered Wildlife Accident Reporting System to identify areas of increased wildlife collisions and to monitor direct effects on wildlife.	Operations	Contractor
13.16	Identify the location of sensitive wildlife habitats, including but not limited to habitat for species at risk, red and blue listed plant communities and high biodiversity habitats, on detailed design drawings in order to avoid or minimize potential effects to these areas.	Pre-construction	Contractor
<b>14.0</b>	<b>Species at Risk</b>		
14.1	Ensure that all reasonable measures are taken to avoid or lessen effects of the Project on listed wildlife species and their critical habitat and that potential effects that could occur are monitored. All mitigation and monitoring measures will be undertaken in a manner that is consistent with applicable recovery strategy and actions plans.	Pre-construction, Construction	Contractor, MoT
14.2	Undertake a salvage program for Pacific water shrew from, at a minimum, high and moderate-rated habitat adjacent to the SFPR. Other areas potentially requiring salvage will include lower-rated habitat, connected to higher-rated habitat, and will be determined in consultation with MoE and the PWS Recovery Team.	Pre-construction, Construction	Contractor
14.3	Consult with MoE regarding the mitigation of potential effects on Pacific water shrew and take all practical steps to apply the most recent Pacific water shrew best management practices to address potential effects including identifying additional opportunities to avoid direct effects to areas, designated as critical habitat by the PWS Recovery Team, during design, construction and operation.	Pre-construction, Construction	Contractor

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
14.4	Consult with MOE to develop a mitigation and compensation strategy for Pacific water shrew, where opportunities are available, based on habitat quality and connectivity to surrounding habitat. Undertake sampling program, where required, to determine the presence and distribution of Pacific water shrew to support detailed design of mitigation.	Pre-construction, Construction	MoT/Contractor
14.5	Detailed design of wildlife crossing mitigation for southern red-backed vole (RBV) will be conducted assuming the presence of RBV in high and moderate rated habitat identified in the EA. Monitoring of the use of wildlife crossing structures will include provisions for assessing the use of such structures by RBV.	Pre-construction	Contractor
14.6	Undertake a review of local museum specimens to confirm the distribution of <i>Sorex rowheri</i> within the Lower Fraser Valley. Where possible, use findings to support detailed design of mitigation.	Pre-construction	Contractor
14.7	Use information obtained through the Mitigation Monitoring Plan to support detailed planning of mitigation to address potential noise, visual and collision effects of the project on barn owl. Undertake long term monitoring of the effectiveness of such mitigation as part of the implementation of the Mitigation Monitoring Plan.	All phases	Contractor
14.8	Use information obtained through the Mitigation Monitoring Plan to support detailed planning of mitigation, including pre-construction salvage where appropriate, to address potential effects of the project, including those related to collision and changes in hydrology, on red-legged frog and western toad. Undertake long term monitoring of the effectiveness of such mitigation as part of the implementation of the Mitigation Monitoring Plan.	All phases	Contractor
14.9	Consult with MOE to plan and undertake at least one pre-construction, one construction and two operational inventories of at-risk aquatic insects in habitat known to or suspected of supporting such species and potentially affected by the project, including but not necessarily limited to the Fraser Heights Wetland, to confirm the findings of the environmental assessment and to monitor potential impacts of the project on aquatic insects.	All phases	Contractor

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
14.10	<p>Consult with the Canadian Wildlife Service to develop and implement a Mitigation Monitoring Plan to monitor and assess the effectiveness of measures proposed to avoid or mitigate potential effects on Sandhill Crane. The Plan will identify:</p> <ul style="list-style-type: none"> <li>• species habitat requirements;</li> <li>• existing conditions in the project area;</li> <li>• potential project related effects and mitigation;</li> <li>• core indicators for assessing the effectiveness of mitigation; and</li> <li>• proposed study methodology and data interpretation and reporting protocols.</li> </ul>	Pre-construction, Construction	MOT
<b>15.0 Burns Bog</b>			
15.1	Avoid potentially significant impacts to hydrological and ecological values associated with Burns Bog (i.e., alignment refinements to avoid ecological and hydrological values, development of hydrological mitigation that meet the hydrologic objectives identified).	All phases	MOT/Contractor
15.2	Consult with the MV, CoD, MoE, EC, and the Burns Bog Management Planning Committee (BBMPC) and Scientific Advisory Panel (SAP) to ensure design, construction and operation of the Project complements long term management objectives established for the Burns Bog Ecological Conservation Area.	All phases	Contractor
15.3	Consult with the reviewing agencies to finalize construction and post-construction monitoring requirements related to Burns Bog including, but not limited to, those identified in the Vegetation and Wildlife Mitigation Monitoring Strategy (April 2007). Monitoring requirements with respect to Burns Bog will include but not be limited to those relating to: air quality, water quality, water levels, red-listed plant communities, and wildlife.	Construction, Operation	Contractor
15.4	Share environmental data from Burns Bog collected as part of the development of the SFPR project, with agencies responsible for the management of the Burns Bog Ecological Conservancy Area in order to support the implementation of the long term management plan for the Bog.	All phases	Contractor

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
15.5	<p>Design, construct and operate hydrology mitigation infrastructure, to mitigate potential effects of the project on the hydrology of Burns Bog, in a way that meets the following performance objectives:</p> <ul style="list-style-type: none"> <li>• Site specific solutions – The design, construction and operation of hydrology mitigation will be based on, and take into account, site specific conditions.</li> <li>• Compatibility between highway water management and bog water management – Providing for active water level controls in the Bog that are independent of SFPR-related water management.</li> <li>• Prevention of mineral migration into the Bog. – Where indicated, providing a low permeability barrier between the SFPR highway ditch and the lagg ponds/ditches by: using material to construct the berm that supports appropriate vegetation on the berm and prevents the introduction of mineral material into the Bog; and maintaining hydraulic gradients so that Type 1 bog waters flow toward the highway at all times.</li> <li>• Resilience – Providing a design that is sufficiently robust to maintain and actively manage water levels under average and extreme conditions and if Bog conditions change.</li> <li>• Highway and mitigation construction does not preclude future restoration of Burns Bog – Providing flexibility of design that allows, for example, for future water control structures that allow for raising of water level as part of future bog restoration.</li> <li>• Holistic design – Hydrology mitigation concepts are designed in way that ensure they will be compatible with, and help achieve multiple, mitigation requirements.</li> </ul> <p>As the design of hydrology mitigation is advanced, it will be documented in a Hydrology Work Plan. This document will be finalized prior to commencement of pre-load activities around Burns Bog.</p>	All phases	MoT
15.6	<p>Pre-load activities around Burns Bog, including areas north of the Highway 99 interchange and west of Nordel Way, will not commence until TC (and other decision-making authorities as required) has reviewed and is satisfied with the final Hydrology Work Plan and the status of the hydrology mitigation design.</p>	Pre-construction	MoT

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
15.7	Provide opportunities for the active involvement of agencies responsible for the management of the Burns Bog Ecological Conservancy Area, and the Scientific Advisory Panel (SAP), in the design, construction and operation of project related works adjacent to Burns Bog including but not limited to those proposed as mitigation for potential project related effects.	All phases	MoT, Contractor
15.8	Consult with MV, CoD, EC and MoE on the development of a water balance model and a drainage model to support the design, construction and operation of hydrology mitigation infrastructure adjacent to Burns Bog and support implementation of the Burns Bog Ecological Conservancy Area Management Plan.	Pre-construction	Contractor
15.9	Finalize an Air Quality Management Plan, in consultation with TC, EC and other IAERC members as appropriate, prior to commencing pre-loading activities around Burns Bog. This document will identify all technically and economically feasible mitigation measures to be implemented to prevent generation and transmission of dust during the pre-load and construction phases of the project.	Pre-construction	MoT, Contractor
15.10	Collect a minimum of 4 months of baseline dust fall monitoring between June and September 2008. Following the collection of this information, the MOT will meet with TC and EC to discuss the baseline monitoring information collected and the approach for continued data collection, prior to the commencement of pre-loading activities around Burns Bog (i.e., north of the Highway 99 interchange and west of Nordel Way).	Pre-construction	MoT
15.11	Work co-operatively with the Tsawwassen First Nation to maintain appropriate access for TFN members to Burns Bog to facilitate TFN's harvesting rights pursuant to the Tsawwassen Final Agreement	All phases	MoT, Contractor
15.12	Ensure that the development and operation of stormwater management infrastructure does not compromise the ability to achieve hydrology mitigation objectives adjacent to Burns Bog	All phases	MoT, Contractor
15.13	Implement the monitoring and follow-up activities identified in the Screening document, for a period of five years after the project has commenced operation, to ensure the effectiveness of mitigation measures related to aerial deposition, hydrology, and Sandhill crane in the vicinity of Burns Bog.	Operation	Contractor, MoT

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
<b>16.0</b>	<b>Archaeology</b>		
16.1	Ensure that the design, construction and operation of the Project is advanced in a way that avoids, or minimizes potential impacts to known archaeological sites, including the Nottingham Farm, St. Mungo and the Glenrose Cannery sites, as well as other sites that may be encountered during project planning and development.	All phases	Contractor
16.2	Work with participating First Nations who have identified related interests within the context of the ongoing environmental review process and the BC Archaeology Branch regarding investigation of unsurveyed areas within the Project area assessed as having archaeological potential at an appropriate level for an archaeological impact assessment and develop mitigation measures consistent with the BC Archaeological Impact Assessment Guidelines.	Pre-construction	MoT, Contractor
16.3	Obtain a valid <i>Heritage Conservation Act</i> Section 14 Heritage Inspection Permit with adequate provisions to address requirements for investigations and potential impacts to previously unrecorded archaeological sites should they arise. Immediately report previously undocumented archaeological sites that come to light during the construction phase of the Project to the BC Archaeology Branch and participating First Nations.	Pre-construction, Construction	MoT, Contractor
16.4	Include required edits and revisions to the Application in the final <i>Heritage Conservation Act</i> Permit report.	Pre-construction	MoT
16.5	<p>Work with the Musqueam Indian Band and other interested First Nations in developing a mutually acceptable Site Management Plan (SMP) for the Glenrose / St. Mungo area, to encourage the preservation of archaeological deposits through the protection and management of archaeological and heritage resources during planning, design, construction and operation phases of the SFPR project.</p> <p>The Plan will include, but not be limited to:</p> <ul style="list-style-type: none"> <li>• a summary of existing information (archaeology and oral history);</li> <li>• summary of existing site conditions;</li> <li>• site management objectives (short, medium and long term); and</li> <li>• site management strategies (preconstruction, construction, post-construction phases).</li> </ul>	Pre-construction	MoT

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
16.6	Develop and implement an archaeological mitigation program focused on intact archaeological deposits that includes systematic data recovery (excavation) and archaeological monitoring for the St. Mungo and Glenrose Cannery Sites. Develop methodology and sample size with input from the Archaeology Branch and First Nations. Obtain Heritage Conservation Act Section 14 Heritage Investigation Permits and Section 12 Alteration Permits prior to mitigation and/or alteration of known archaeological sites.	Pre-construction, Construction	Contractor
16.7	Work with the Musqueam Indian Band and other interested First Nations in establishing a final design for the SFPR segment in the Glenrose / St. Mungo area focused on minimizing potential project related impacts on identified archaeological resources.	Pre-construction	MoT, Contractor
16.8	Work with the Musqueam Indian Band and other interested First Nations to further explore options/opportunities to establish appropriate First Nation recognition and/or interpretation measures in relation to the Glenrose / St. Mungo sites.	All phases	MoT
16.9	Undertake appropriate archaeological site impact mitigation measures, including construction monitoring and systematic data recovery (i.e., an archaeological excavation), at the St. Mungo and Glenrose Cannery archaeological sites and support these measures with field programs that involve the Musqueam Indian Band and other interested First Nations as appropriate. The proposed mitigation strategy will be based on an archaeological site management plan for the St. Mungo, Wet Site and Glenrose Cannery archaeological sites currently under development in conjunction with representatives of the Musqueam Indian Band.	All phases	MoT, Contractor
16.10	Report the discovery of previously undocumented archaeological sites that may come to light during the construction phase of the SFPR project to the British Columbia Archaeology Branch and interested First Nations. Engage an archaeologist to investigate and assess such sites under the terms and conditions of a Heritage Conservation Act permit.	All phases	Contractor
16.11	Provide opportunities for members of the Musqueam Indian Band and other interested First Nations to participate in field programs supporting the implementation of archaeological site mitigation measures.	All phases	MoT, Contractor



## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
16.12	Notify and invite First Nations to participate in specified archaeological work that is to occur at identified archaeological sites within their respective asserted traditional territories.		
<b>17.0</b>	<b>Heritage</b>		
17.1	Ensure that the design, construction and operation of the proposed project is advanced in a way that avoids, or minimizes potential impacts to heritage buildings	All phases	Contractor, MoT
17.2	Consult with the Delta Heritage Advisory Commission and the Surrey Heritage Committee to define heritage interests and work with the Delta Museum and Archive to develop a photo record and inventory of potentially affected heritage houses.	Pre-Construction, Construction	MoT, Contractor
17.3	Prior to construction undertake pre-condition surveys with respect to heritage buildings, as further described in commitment 9.7.	Pre-construction	Contractor
17.4	Avoid, where practical and technically feasible, direct impacts to heritage buildings.	All phases	Contractor
<b>18.0</b>	<b>Navigable Waters</b>		
18.1	Obtain regulatory approval related to crossings of designated Navigable Waters pursuant to the Navigable Waters Protection Act (NWPA), including but not necessarily limited to, McAdam Creek, Collings Creek, Manson Canal, and Crescent Slough, prior to commencement of works.	Pre-Construction	MoT, Contractor
<b>19.0</b>	<b>Socio-Economic</b>		
19.1	Mitigate potential Project-related visual/lighting impacts through use of screening, fencing and landscaping in consultation with local government. Use dark-sky compliant lighting for the Project.	Pre-construction, Construction	Contractor
19.2	Manage potential impacts to emergency response services by: <ul style="list-style-type: none"> <li>Ensuring emergency response plans (including a Spill Response Management and Emergency Response Plan) are in place during the construction phase of the Project, and updated annually, at a minimum;</li> <li>Consulting first responders in Traffic Management Plan development; and</li> <li>Consulting with local fire departments to ensure adequate access.</li> </ul>	Pre-construction, Construction	Contractor

## OWNER'S TABLE OF COMMITMENTS AND ASSURANCES – June 20, 2008

Ref	Objective Commitments and Assurances	Timing	Delivered By
<b>20.0 Rail</b>			
20.1	Avoid or minimize potential impacts from Project works and activities to rail corridors.	All phases	Contractor
20.2	Notify Transport Canada of project works as required under the <i>Notice of Railway Works Regulations</i> .  Notify the public and affected stakeholders in accordance with the <i>Railway Safety Act</i> .	All phases	Contractor
20.3	Comply with Canadian transportation standards and regulations as well as the design specifications of the respective railway with regard to vertical and horizontal railroad clearance of new or upgraded infrastructure.	Pre-construction	Contractor
20.4	Minimize railroad closures during construction.	Construction	Contractor

### Abbreviations and Acronyms

ALC	Agricultural Land Commission	EC	Environment Canada
ALR	Agricultural Land Reserve	EMP	Environmental Management Plan
Application	Environmental Assessment Application	ERP	Emergency Response Plan
BBMPC	Burns Bog Management Planning	MV	Metro Vancouver
Committee			
BMP	Best Management Practices	HC	Health Canada
CoD	Corporation of Delta	MAL	Ministry of Agriculture and Lands
CoS	City of Surrey	MoE	Ministry of Environment
CWS	Canadian Wildlife Service of Environment	MoT	Ministry of Transportation
Canada			
DFI	Delta Farmers' Institute	PM	Particulate Matter
DFO	Fisheries and Oceans Canada	ROW	Right-Of-Way
EAC	Environmental Assessment Certificate	SAP	Scientific Advisory Panel (of the BBMPC)

**Nutton, Byron**

---

**From:** Groenewoud, Taylor (EC) <taylor.groenewoud@canada.ca>  
**Sent:** 2019-March-15 12:27 PM  
**To:** Inouye, Kevin; Jack Smith; Bryant-Gravelle, Michelle  
**Cc:** Norma Powell; Nutton, Byron; Marshall, Kathryn (EC)  
**Subject:** RE: {2200-001.01}15Mar\_eml\_hemmera\_rti\_to\_committee\_RESPONSES\_TO\_TC\_AND\_ECCC-1\_FEB2019EEE\_#KITSUM 289; #METLA-PA-6550; DFO #18-HPAC-00245; TC # 2019-500061

Hi Michelle, Kevin and Jack,

Will the federal authorities be seeking second round comments from ECCC (i.e. to indicate if the issue is outstanding or resolved)?

Cheers,  
 Taylor

**From:** Norma Powell <npowell@hemmera.com>  
**Sent:** Friday, March 15, 2019 10:13 AM  
**To:** [REDACTED] Byron Nutton <Byron.Nutton@dfo-mpo.gc.ca>; [REDACTED]  
 [REDACTED]; Dennis Blake <dblake@rti.ca>; Elizabeth Harries <elizabeth.harries@tc.gc.ca>; [REDACTED]  
 [REDACTED] Groenewoud, Taylor (EC) <taylor.groenewoud@canada.ca>; Hillary Hyland  
 <Hillary.hyland@tc.gc.ca>; Jack Smith <jsmith@rupertport.com>; [REDACTED]  
 [REDACTED] John Emery <jemery@hemmera.com>;  
 [REDACTED] Marshall, Kathryn (EC) <kathryn.marshall@canada.ca>; Kevin  
 Inouye <Kevin.Inouye@tc.gc.ca>; [REDACTED]  
 [REDACTED] Michael Engelsjord <michael.engelsjord@dfo-mpo.gc.ca>; Michelle Bryant-Gravelle  
 <mbryant@rti.ca>; [REDACTED] Norma Powell <npowell@hemmera.com>;  
 [REDACTED]; Robert Bracken  
 [REDACTED] Lewis, Scott (EC) <scott.lewis@canada.ca>; Tanya Martin  
 <tanya.martin@tc.gc.ca>; Seto, Vivian (Vancouver) [REDACTED]  
**Cc:** [REDACTED]  
**Subject:** {2200-001.01}15Mar\_eml\_hemmera\_rti\_to\_committee\_RESPONSES\_TO\_TC\_AND\_ECCC-1\_FEB2019EEE\_#KITSUM 289; #METLA-PA-6550; DFO #18-HPAC-00245; TC # 2019-500061

Dear Technical Committee Members,

Please find attached the Comment and Responses to Transport Canada and Environment and Climate Change Canada's review of the EEE dated February 2019.

Environment and Climate Change Canada have submitted a second set of comments to which responses will be developed.

Regards,  
 Norma

Norma Powell, R.P.Bio., ENV SP  
Senior Project Manager



**Hemmera, an Ausenco Company**

18th Floor, 4730 Kingsway | Burnaby, BC | V5H 0C6

T: 604.669.0424 ext. [REDACTED] F: 604.669.0430 | C: [REDACTED]

[npowell@hemmera.com](mailto:npowell@hemmera.com) | [hemmera.com](http://hemmera.com) | [unsubscribe](#)

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**Nutton, Byron**

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**From:** Committee Facilitator <Committee.Facilitator@hemmera.com>  
**Sent:** 2019–March-15 1:06 PM  
**To:** [REDACTED] Nutton, Byron; [REDACTED]; Dennis Blake ; Elizabeth Harries ; [REDACTED]  
Groenewoud, Taylor (EC); [REDACTED] Jack Smith ; [REDACTED]  
[REDACTED] John Emery; [REDACTED] Kevin Inouye ;  
[REDACTED] Engelsjord, Michael; Michelle Bryant-Gravelle ; [REDACTED]  
[REDACTED] Norma Powell; [REDACTED] Scott  
Lewis ; Tanya Martin; [REDACTED] (Vancouver); [REDACTED]  
**Cc:** [REDACTED]  
**Subject:** Ridley Proposed Berth Expansion #KITSUM 289; #METLA-PA-6550; DFO #18-HPAC-00245; TC # 2019-500061

Good afternoon,

I wanted to let the Technical Committee know that the comment period has been extended to Friday, March 29<sup>th</sup>. This will allow committee members additional time to submit comments. I believe you will be receiving a similar message from RTI.

If you would, it would expedite the process if you could submit comments in spreadsheet form in addition to PDF.

Could the Nations please reply to me confirming receipt of this message?

Regards,  
Darrell

Darrell Desjardin  
Technical Committee Facilitator

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## Nutton, Byron

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**From:** [REDACTED]  
**Sent:** 2019-March-15 1:11 PM  
**To:** Bryant-Gravelle, Michelle; [REDACTED]  
[REDACTED]; Jack Smith; Blake, Dennis; Martin, Tanya; Inouye, Kevin; 'Harries, Elizabeth';  
Nutton, Byron; Engelsjord, Michael  
**Cc:** Darrell Desjardin; Norma Powell; Bracken, Robert (Vancouver); [REDACTED]  
**Subject:** RE: RTI Berth Expansion Comment Period Extension

Thanks Michelle. Have we or will we soon be receiving Appendix E and F (Aboriginal Engagement Report and Record)?

Thanks,  
[REDACTED]

**From:** Bryant-Gravelle, Michelle <mbryant@rti.ca>

**Sent:** March 15, 2019 1:04 PM

**To:** [REDACTED]  
[REDACTED]  
[REDACTED] Jack Smith <JSmith@rupertport.com>; Blake, Dennis  
<DBLAKE@rti.ca>; Martin, Tanya <tanya.martin@tc.gc.ca>; Inouye, Kevin <kevin.inouye@tc.gc.ca>; 'Harries, Elizabeth'  
<elizabeth.harries@tc.gc.ca>; byron.nutton@dfo-mpo.gc.ca; Engelsjord, Michael <Michael.Engelsjord@dfo-mpo.gc.ca>  
**Cc:** Darrell Desjardin <d-desjardin@hemmera.com>; Norma Powell <npowell@hemmera.com>; Bracken, Robert  
(Vancouver) <robert.bracken@advisian.com>; [REDACTED]  
**Subject:** RTI Berth Expansion Comment Period Extension  
**Importance:** High

Hello everyone,

Given the feedback on timing for comments, RTI has decided to extend the timeline to receive comments from the EEE by two weeks. Please send in your comments to Norma and myself by March 29, 2019.

Please respond to the email so that I know this message was received.

Regards,



**MICHELLE BRYANT-GRAVELLE**

Corporate Affairs Manager

**RIDLEY TERMINALS INC.**

PO Bag 8000, Prince Rupert, BC Canada V8J 4H3  
Tel: 250.627.3585 Cell: [REDACTED] Fax: 250.624.2389  
[mbryant@rti.ca](mailto:mbryant@rti.ca) [www.rti.ca](http://www.rti.ca)

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## Nutton, Byron

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**From:** [REDACTED]  
**Sent:** 2019-March-15 1:16 PM  
**To:** Committee Facilitator  
**Cc:** [REDACTED] Nutton, Byron; [REDACTED] Dennis Blake; Elizabeth Harries; [REDACTED]  
Groenewoud, Taylor (EC); [REDACTED] Jack Smith; [REDACTED]  
[REDACTED] John Emery; [REDACTED] Kevin Inouye; [REDACTED]  
Engelsjord, Michael; Michelle Bryant-Gravelle; Nicole Wallace; Norma Powell;  
[REDACTED] Scott Lewis; Tanya Martin; [REDACTED]  
[REDACTED] (Vancouver); [REDACTED] Lindsay Jones  
**Subject:** Re: Ridley Proposed Berth Expansion #KITSUM 289; #METLA-PA-6550; DFO #18-HPAC-00245; TC # 2019-500061

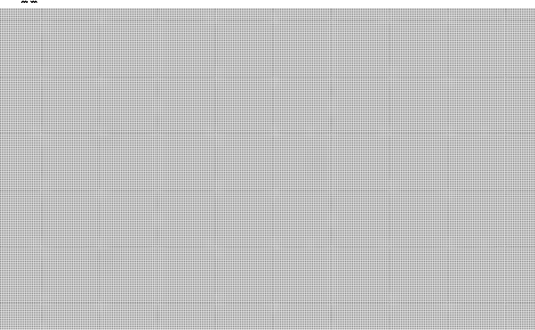
Acknowledged.  
Thank  
[REDACTED]

On Fri, Mar 15, 2019 at 1:05 PM Committee Facilitator <Committee.Facilitator@hemmera.com> wrote:

>  
> Good afternoon,  
>  
>  
>  
> I wanted to let the Technical Committee know that the comment period has been extended to Friday, March 29th. This will allow committee members additional time to submit comments. I believe you will be receiving a similar message from RTI.  
>  
>  
>  
> If you would, it would expedite the process if you could submit comments in spreadsheet form in addition to PDF.  
>  
>  
>  
> Could the Nations please reply to me confirming receipt of this message?  
>  
>  
>  
> Regards,  
>  
> Darrell  
>  
>  
>  
> Darrell Desjardin  
>  
> Technical Committee Facilitator  
>  
>  
>



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## Nutton, Byron

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**From:** Thorpe, Suzanne  
**Sent:** 2019–March-15 2:51 PM  
**To:** Nutton, Byron  
**Subject:** Automatic reply: Delta 80th Street Water Intake project - 7th year monitoring results

Thanks for your e-mail. [REDACTED] and will try to respond to your email via remote access if response is needed.

**Page 1304**

**is withheld pursuant to section  
est retenue en vertu de l'article**

**19(1)**


**of the Access to Information Act  
de la Loi sur l'accès à l'information**

## Nutton, Byron

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**From:** Cooper, Tola  
**Sent:** 2019-March-15 3:28 PM  
**To:** Bouchard, Michelle; Smith, Shona; Ridley, Teri; Pang, Gabrielle; Wright, Marina; Barber, Boone; Nutton, Byron; Pulvermacher, Holly  
**Subject:** Just FYI - BC SRIF Positions

You may have seen this, but just in case. There are two sides of the shop as I understand it, the G&C and the Partnerships, I keep running into Christie Whelan (the Partnership side lead) in airports so have been asking her about the program, will be high profile and interesting!

 nothing is meant by me sending this to you – just thought you may be interested or know someone who is!

[http://intra.dfo-mpo.gc.ca/loop-courant/pac/2019/20190315/20190315\\_01\\_e.htm](http://intra.dfo-mpo.gc.ca/loop-courant/pac/2019/20190315/20190315_01_e.htm)



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## AMENDED – EXCITING OPPORTUNITIES AVAILABLE AT VARIOUS GROUPS AND LEVELS WITH THE BC SALMON RESTORATION AND INNOVATION FUND (BCSRIF)

The BC Salmon Restoration and Innovation Fund (BCSRIF) was announced in November 2018 and as part of the 2018 Fall Economic Statement. The Fund represents a federal-provincial investment of up to \$142 million over the next five years with a focus on salmon stock protection and restoration, as well as ensuring the fish and seafood sector in British Columbia is positioned for long-term environmental and economic sustainability. Similar to the successful Atlantic Fisheries Fund, the BCSRIF will help support projects focused on science partnerships, innovation, and infrastructure investments that improve productivity, sustainability and safety. Further details regarding the program will be available online shortly: [www.canadafisheriesfunds.ca](http://www.canadafisheriesfunds.ca)

If you want to be a part of a fast-paced, innovative program, with opportunities to collaborate with a diverse range of clients and partners, this is the team for you!

We are currently seeking employees that are interested in at-level opportunities for the following positions:

**AS-01: Administrative Officer**

**AS-02: Finance & Payment Officer**

**BI-02: Biologist**

**BI-03: Senior Biologist**

**CO-02: Senior Project Officer**

**CO-03: Manager, Agreements**

**PM-04: Project Officer**

**PM-05: Project Coordinator**

**PM-05: BCSRIF Secretariat Coordinator**

These positions may be staffed using various mechanisms such as assignments or deployments. Locations of positions are noted below with the duties of the positions.

If you are interested in any of these positions, please submit your CV and cover letter **by end of day Friday, March 29th, 2019 to: My PAC HR-Ma PAC HR@dfo-mpo.gc.ca**

In your cover letter, indicate your substantive group and level.

**Key duties of the positions:**

**AS-01: Administrative Officer (Vancouver)**

- Monitors the BCSRIF budgets and preparing financial reports and summaries
- Coordinates with HR on processing staffing and training requests
- Provides general administrative support for the BCSRIF team (purchasing supplies, maintain equipment, advising on processes and procedures, ensuring appropriate filing structures in the shared network drive)
- Correspondence and information management

**AS-02: Finance & Payment Officer (Vancouver)**

- Supports the review of project applications, including liaising with clients to obtain additional details, when needed
- Conducts benefits monitoring which includes verification of expected results from each project
- Liaises with Finance to process payments based on the terms outlined in each Contribution Agreement
- Reviews recipient claims for payment, financial statements, year-end reports
- Prepares reports on program funds and payments

**BI-02: Biologist (Vancouver, Nanaimo, Prince Rupert, Kamloops, Sidney, or Whitehorse)**

- Provides advice and assistance to Indigenous groups, stakeholders and other project proponents on program funding priorities and application process.
- Providing scientific information and advice for the review of project proposals and project feasibility.
- Consults with Science and other departmental staff to seek input on project proposal review.
- Work internally in DFO, particularly with the Science sector, to facilitate information and data sharing required for the delivery of funded projects.
- Input to the tracking and reporting for funded project progress and deliverables.

**BI-03: Senior Biologist (Vancouver, Nanaimo, Prince Rupert, Kamloops, Sidney, or Whitehorse)**

- Provides leadership and supervision to assigned staff in project teams and working groups
- Develops and maintain a network of contacts in the fish and seafood sector in BC from various organizations; participates in interdepartmental and intergovernmental meetings
- Provides advice and assistance to Indigenous groups, stakeholders and other project proponents on program funding priorities and application process

- Providing information, analysis, advice and recommendations based on scientific and technical knowledge for the comprehensive review of project proposals and project feasibility
- Develops guidelines, procedures, and protocols for scientific and feasibility review of project proposals
- Determines needs and coordinates input from Science and other departmental staff on project proposal review
- Tracks and reports on funded project progress and deliverables

**CO-02: Senior Project Officer (Vancouver, Nanaimo, Prince Rupert, Kamloops, Sidney, or Whitehorse)**

- Provides leadership and supervision to assigned staff in project teams and working groups
- Develops and maintain a network of contacts in the fish and seafood sector in BC from various organizations; participates in interdepartmental and intergovernmental meetings
- Provides advice and assistance to Indigenous groups, stakeholders and other project proponents on program funding priorities and application process
- Providing information, analysis, advice, and recommendations based on knowledge of the commercial fishing and/or the aquaculture sector for the comprehensive review of project proposals and project feasibility
- Develops guidelines, procedures, and protocols for comprehensive and feasibility review of project proposals
- Determines needs and coordinates input from Fisheries and Aquaculture management and other departmental staff on project proposal review
- Tracks and reports on funded project progress and deliverables

**CO-03: Manager, Agreements (Vancouver)**



- Manages the Agreements team (4 staff), including staff scheduling, performance management, staff development, distributing work to ensure that key commitments and deadlines are met
- Financial responsibilities for the annual BCSRIF budgets for the Agreement team
- Coordinates with BCSRIF Manager, Partnerships on project analysis and approvals
- Coordinates with Provincial representatives on the BCSRIF team on applications and project analysis and approvals
- Supports the Director, BC Salmon Restoration and Innovation Program in meeting program targets and fulfilling corporate reporting requirements
- Liaises with NHQ on corporate reporting requirements and ensuring that program delivery is consistent with the most current policy direction
- Participates in manager-level working groups and committees to coordinate the delivery of G&C programs within the Pacific Region and to avoid overlap in funding programs

**PM-04: Project Officer (Vancouver)**

- Administers the process to assess project proposals, including the preparation of summary recommendation documents for review by various officials throughout the review and approval process
- Drafts Contribution Agreements with appropriate conditions that reflect risks associated with the proposed activities
- Tracks files throughout the project lifecycle, and preparing reports to respond to requests and fulfill corporate reporting requirements
- Provides advice to program clients and stakeholders on the BCSRIF and other G&C programs offered by the federal government

- Participates in working level committees and working groups to coordinate the delivery of DFO G&C programs
- Provides client services to recipients related to the negotiation, approval, implementation and monitoring phases of the contribution agreement cycle

**PM-05: Project Coordinator (Vancouver, Nanaimo, Prince Rupert, Kamloops, Sidney, or Whitehorse)**

- Provides advice and assistance to Indigenous groups, stakeholders, and project proponents on program funding priorities and application process
- Applies a comprehensive knowledge of the commercial fishing and/or the aquaculture sector challenges to provide information and advice for the review of project proposals and project feasibility
- Consults with other departmental staff to seek input on project proposal review
- Work internally in DFO, particularly with Fisheries and Aquaculture management, to facilitate information and data sharing required for the delivery of funded projects
- Input to the tracking and reporting for funded project progress and deliverables

**PM-05: BCSRIF Secretariat Coordinator (Vancouver, Nanaimo, Prince Rupert, Kamloops, Sidney, or Whitehorse)**

- Coordinates BCSRIF secretariat across the agreements and partnerships and outreach teams.
- Coordinates BCSRIF secretariat input for senior management and ministerial briefings, and reporting requirements
- Leads on the coordination for the bilateral steering and management committees with the province of BC
- Provides advice and assistance to Indigenous groups, stakeholders and project proponents on program funding priorities and application process

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Authors are responsible for the quality, accuracy and appropriateness of messages published in *In the Loop*.

Please address any concerns or questions relating to the content of this message to [Ramanjeet Mangat](#) at 604-666-6283.

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Last Updated: 2019-03-15

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**Nutton, Byron**

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**From:** Runciman, Bruce  
**Sent:** 2019–March-16 4:07 PM  
**To:** Hardacre, Kim  
**Cc:** Nutton, Byron  
**Subject:** FW: Reallocation Request  
**Attachments:** 03-15-2019\_Reallocation Request\_Ocean Wise.pdf

Hi Kim.

This reallocation request relates to a 2015 HSP-funded project. I've had no involvement with HSP projects beyond those that started this fiscal year. My understanding is that ECCC remained responsible for all aspects of those earlier projects. Do you have a contact with ECCC that you can touch base with to confirm that's the case and pass on this reallocation request? I'd appreciate it if you could let me know either way.

Thanks, Bruce.

**From:** Jessica Torode [REDACTED]  
**Sent:** March 15, 2019 12:59 PM  
**To:** Hardacre, Kim <Kim.Hardacre@dfo-mpo.gc.ca>; Runciman, Bruce <Bruce.Runciman@dfo-mpo.gc.ca>  
**Subject:** Reallocation Request

Hi Kim and Bruce,

Please see my attached re-allocation request for funds pertaining to the final year of our three-year project, "Diversifying a Citizen Science Approach to Cetacean and Sea Turtle Stewardship and Protection".

Please let me know if you require any more information.

Warm regards,

**Jessica Torode-Scott**  
COORDINATOR, BC CETACEAN SIGHTINGS NETWORK  
[REDACTED]

D 604-659-3770

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are healthy and flourishing. | [ocean.org](http://ocean.org)



NOTIFY US IMMEDIATELY SO THAT WE MAY CORRECT OUR INTERNAL RECORDS. PLEASE THEN DELETE THE ORIGINAL MESSAGE. THANK YOU

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We enjoy talking to you – If you do not wish to receive further information from us (where applicable), please email [PRIVACY@OCEAN.ORG](mailto:PRIVACY@OCEAN.ORG) or write to our policy officer at Ocean Wise Conservation Association, PO Box 3232 Vancouver, BC V6B 3X8  
For more information about our privacy or anti-spam policies, please visit [www.ocean.org](http://www.ocean.org)

### Reallocation Request

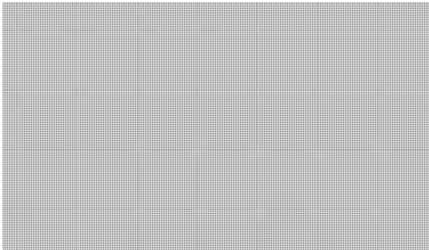
#### Project: Diversifying a Citizen Science Approach to Cetacean and Sea Turtle Stewardship and Protection

Expense Category:	Description:	Amount:	Reallocate to:	Reason:
Travel	<i>BCCSN volunteer travel for the Dock Talk program, census activity and ambassador program. This travel will allow volunteers to support BCCSN programs in coastal communities identified as data deficient and with target groups identified as key and under-represented within the Network (5 booklets of bus tickets @ 25/each, 4 round-trip ferry fares @ \$565, 38 x \$10 parking fee, hotel room @ \$150 x 6, daily food allowance @ \$50/day/person for 3 people x 2.5 days, misc. travel expenses for ambassador volunteers to travel to Vancouver for training @ \$350/each for 3 people).</i>	<b>\$1,300</b>	Travel <i>BCCSN staff travel for outreach presentations and Dock Talk volunteer training and management, census volunteer training and management. This travel will allow for BCCSN programs to function in coastal communities identified as data deficient and with target groups identified as key and under-represented within the Network (9 round-trip ferry fares @ \$200/each, 3 tanks of gas @ \$60/each, hotel room @ \$100 x 16, daily food allowance @ \$50 x 16, 3 round-trip flights @ ~\$500, water taxi service @ \$100, misc. travel expenses @ \$400).</i>	Less funding than anticipated was needed for volunteer travel. Many of our volunteers traveled by bus to outreach events instead of by car, an expense that is covered by the Vancouver Aquarium. Ambassador volunteers did not come to Vancouver for training-instead, the BCCSN coordinator traveled to their communities to train them.  Due to the expanded scope of the BCCSN, our staff have had many more requests to train naturalist groups and meet with ecotourism operators, resulting in an increased need for staff travel funds.
Travel	<i>BCCSN volunteer travel for the Dock Talk program, census activity and ambassador program. This travel will allow volunteers to support BCCSN programs in coastal communities identified as data deficient and with target groups identified as key and under-represented within the Network (5 booklets of bus tickets @</i>	<b>\$1,900</b>	<b>Material and supplies expenditures</b> <i>Props and materials to support Dock Talk, census and ambassador programs. These items will help identify volunteers as part of the BCCSN, promote the program and its activities and enhance awareness of the program (volunteer t-shirts x 36 @ \$432, fold-</i>	Less funding than anticipated was needed for volunteer travel. Many of our volunteers traveled by bus to outreach events instead of by car, an expense that is covered by the Vancouver Aquarium. Ambassador volunteers did not come to Vancouver for training-instead, the BCCSN coordinator traveled to

	25/each, 4 round-trip ferry fares @ \$565, 38 x \$10 parking fee, hotel room @ \$150 x 6, daily food allowance @ \$50/day/person for 3 people x 2.5 days, misc. travel expenses for ambassador volunteers to travel to Vancouver for training @ \$350/each for 3 people).		out table-top displays x 3 @ \$250/each, equipment container x 3 @ \$75/each, misc. props for new Dock Talk and ambassador teams and for updating existing materials @ \$1650)	<p>their communities to train them.</p> <p>The BCCSN's Dock Talk materials have experienced many summers of outreach activities, and as a result, many of our props are damaged. We would use these reallocated funds to replace our broken Dall's porpoise skull, purchase more killer whale teeth and a dolphin skull, purchase more brochure holders, replace our tablecloth with a new branded one, and replace our damaged and cracked brochure holders.</p>
<b>Contractors</b>	Advertising for census activity (radio, social media, print)	<b>\$1,250</b>	<b>Communication and printing, production and distribution expenditures</b>	<p>Advertising for this year's census was conducted at no cost, primarily through social media platforms (wildwhales.org and our facebook page), posters and postcards, and word of mouth by our ambassadors, volunteers, and staff.</p> <p>The BCCSN would like to reallocate these funds to print copies of our summary report for our Entanglement Workshop, conducted in the 2017-18 fiscal year. This report includes information about large whale entanglement in B.C, how to report entanglements, and how to document</p>



				<p>entanglements to best support first responders. These reports would be distributed to mariners who are likely to encounter an entangled whale (commercial mariners, fishers, and ecotourism operators). This activity will increase detection and reporting of entangled whales in British Columbia and will help support authorized responders in mounting an effective emergency response.</p>
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Jessica Torode-Scott  
Coordinator, BCCSN



604.659.3770

**Nutton, Byron**

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**From:** Hardacre, Kim  
**Sent:** 2019–March-17 1:10 AM  
**To:** Runciman, Bruce  
**Cc:** Nutton, Byron  
**Subject:** Re: Reallocation Request

Hi Bruce,

Yes, I do have a contact at ECCC and will contact them about this on Monday. I'll make sure I Cc you on the reply to Jessica.

Thanks for the info re: this being a 2015 agreement...I truly do not enjoy the HSP tracking "system" and it would have taken me awhile to dig that out.

Have a good Sunday.  
Kim

Sent from my BlackBerry 10 smartphone on the Bell network.

---

**From:** Runciman, Bruce  
**Sent:** Saturday, March 16, 2019 4:07 PM  
**To:** Hardacre, Kim  
**Cc:** Nutton, Byron  
**Subject:** FW: Reallocation Request

Hi Kim.

This reallocation request relates to a 2015 HSP-funded project. I've had no involvement with HSP projects beyond those that started this fiscal year. My understanding is that ECCC remained responsible for all aspects of those earlier projects. Do you have a contact with ECCC that you can touch base with to confirm that's the case and pass on this reallocation request? I'd appreciate it if you could let me know either way.

Thanks, Bruce.

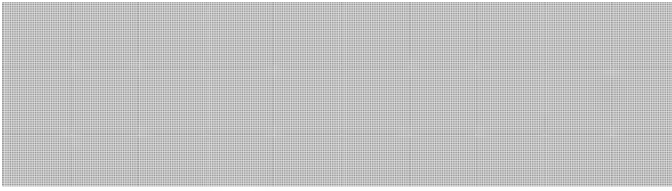
**From:** [REDACTED]  
**Sent:** March 15, 2019 12:59 PM  
**To:** Hardacre, Kim <Kim.Hardacre@dfo-mpo.gc.ca>; Runciman, Bruce <Bruce.Runciman@dfo-mpo.gc.ca>  
**Subject:** Reallocation Request

Hi Kim and Bruce,

Please see my attached re-allocation request for funds pertaining to the final year of our three-year project, "Diversifying a Citizen Science Approach to Cetacean and Sea Turtle Stewardship and Protection".

Please let me know if you require any more information.

Warm regards,



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For more information about our privacy or anti-spam policies, please visit [www.ocean.org](http://www.ocean.org)

## Nutton, Byron

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**From:** Boutillier, Jaclyn  
**Sent:** 2019–March-17 9:26 PM  
**To:** Nutton, Byron  
**Subject:** RE: RFCPP - West Coast Aquatic Projects Summary - BC Timber Sales Habitat Banking

Hi Byron,

Just for clarification, is there anything else I can do to help out at this point? I haven't heard back from Suzanne yet, however, I know you and I discussed me putting together a map to locate projects?

Thanks,

Jaclyn

**From:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Sent:** Thursday, March 14, 2019 1:51 PM  
**To:** Thorpe, Suzanne <Suzanne.Thorpe@dfo-mpo.gc.ca>  
**Cc:** Boutillier, Jaclyn <Jaclyn.Boutillier@dfo-mpo.gc.ca>; Runciman, Bruce <Bruce.Runciman@dfo-mpo.gc.ca>  
**Subject:** RE: RFCPP - West Coast Aquatic Projects Summary - BC Timber Sales Habitat Banking

As discussed.

**From:** Runciman, Bruce <Bruce.Runciman@dfo-mpo.gc.ca>  
**Sent:** 2019–March-12 6:22 PM  
**To:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Cc:** Hardacre, Kim <Kim.Hardacre@dfo-mpo.gc.ca>; Boutillier, Jaclyn <Jaclyn.Boutillier@dfo-mpo.gc.ca>  
**Subject:** RE: RFCPP - West Coast Aquatic Projects Summary - BC Timber Sales Habitat Banking

Thanks for pulling all this information together Jaclyn. Lots of work and much appreciated.

Byron: it looks like at least the Taylor Borrow Pits (16-HPAC-00421), Taylor Relic Channel (16-HPAC-01309) and Taylor River Glulam (16-HPAC-00828) projects should be cross-checked against habitat banks linked to BC Timber Sales in the Port Alberni area.

Is this something you and/or Suzanne can lead or delegate?

Let us know if you need anything further?

Thanks, Bruce.

**From:** Boutillier, Jaclyn <Jaclyn.Boutillier@dfo-mpo.gc.ca>  
**Sent:** March 8, 2019 1:14 PM  
**To:** Runciman, Bruce <Bruce.Runciman@dfo-mpo.gc.ca>; Hardacre, Kim <Kim.Hardacre@dfo-mpo.gc.ca>  
**Cc:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Subject:** RFCPP - West Coast Aquatic Projects Summary - BC Timber Sales Habitat Banking

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**Nutton, Byron**

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**From:** Darrell Desjardin <d-desjardin@hemmera.com>  
**Sent:** 2019-March-17 10:49 PM  
**To:** Committee Facilitator [REDACTED]  
[REDACTED] Dennis Blake; Elizabeth Harries;  
Hillary.hyland@tc.gc.ca; [REDACTED] Jack Smith;  
[REDACTED] John Emery; [REDACTED]  
kathryn.marshall@canada.ca; Kevin Inouye; Martin, Tanya; Engelsjord, Michael; Michelle  
Bryant-Gravelle; Nutton, Byron; [REDACTED] Norma Powell; Robert Bracken; Scott  
Lewis; Taylor Groenewoud; Seto, Vivian (Vancouver); [REDACTED]  
[REDACTED]  
**Subject:** Draft Meeting Summary Notes from March 7, 2019 Conference Call Meeting  
**Attachments:** DRAFT RTITC Meeting Summary March 7 2019.pdf

Please find enclosed the draft notes and action items from our in person meeting on March 7, 2019. Please let me know if you have any comments or changes to the meeting notes.

Regards

Darrell

Darrell Desjardin  
Technical Committee Facilitator

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## Ridley Terminals Inc. Technical Committee

DRAFT MEETING SUMMARY March 7, 2019		
MEETING	Ridley Terminals Inc. Technical Committee Meeting Number 10	
DATE	Thursday, March 7, 2019	
TIME/DURATION	10:00 AM – 4:00 PM	
LOCATION	Prestige Hotel, Prince Rupert and via Conference Call	
ATTENDEES	<p><b>Facilitation</b></p> <ul style="list-style-type: none"><li>• Darrell Desjardin (DD)</li></ul> <p><b>Gitga’at</b></p> <ul style="list-style-type: none"><li>• [REDACTED] (via telephone)</li></ul> <p><b>Gitxaala</b></p> <ul style="list-style-type: none"><li>• [REDACTED]</li></ul> <p><b>Kitselas</b></p> <ul style="list-style-type: none"><li>• [REDACTED]</li></ul> <p><b>Kitsumkalum</b></p> <ul style="list-style-type: none"><li>• [REDACTED]</li></ul> <p><b>Lax Kw’alaams</b></p> <ul style="list-style-type: none"><li>• [REDACTED]</li></ul> <p><b>Metlakatla</b></p> <ul style="list-style-type: none"><li>• [REDACTED]</li></ul>	<p><b>Advisian</b></p> <ul style="list-style-type: none"><li>• Rob Bracken (RB)</li><li>• Vivian Seto (VS) (via telephone)</li></ul> <p><b>Transport Canada (TC)</b></p> <ul style="list-style-type: none"><li>• Tanya Martin (TM) (via telephone)</li><li>• Kevin Inouye (KI) (via telephone)</li></ul> <p><b>Environment Canada (EC)</b></p> <ul style="list-style-type: none"><li>• Taylor Groenwoud (TG) (via telephone)</li><li>• Kathryn Marshall (KM) (via telephone)</li><li>• Mario Sebata (MS) (via telephone)</li></ul> <p><b>Fisheries and Oceans Canada</b></p> <ul style="list-style-type: none"><li>• Byron Nutton Regrets</li></ul> <p><b>Prince Rupert Port Authority</b></p> <ul style="list-style-type: none"><li>• Irene Mills (IM)</li></ul> <p><b>Ridley Terminals Inc. (RTI)</b></p> <ul style="list-style-type: none"><li>• Michelle Bryant-Gravelle (MBG)</li></ul> <p><b>Hemmera</b></p> <ul style="list-style-type: none"><li>• Norma Powell (NP)</li><li>• John Emery (JE)</li></ul>
Action Summary	<ul style="list-style-type: none"><li>• See Action Items in the Meeting Notes</li></ul>	
MEETING DISCUSSION SUMMARY		
RTITC Meeting –Key Discussions		
A. <u>Review of Action Items from February 14, 2019 Meeting</u>		

As per last meeting Lindsey Jones asked had asked the Aboriginal groups to identify who would be able to meet Lindsey to address rights and title effects and gaps in the process. Lindsey and Michelle have not heard back formally from any of the groups.

Optional meeting date of March 18 that could used for further discussion, if necessary .

B. DAS Update

Noted that for DAS, until ECCC receives an application, ECCC won't be commenting on DAS as part of the Section 67. ECCC will comment if/when an application is submitted. Consultation would also be undertaken by ECCC at the time that they were to consider a permit. TG – ECCC's role as a Federal Authority (FA) is not needed at this time due to the project not going to DAS. ECCC involvement depends if DAS application is made and/or a *Species at Risk Act* (SARA) for a species that ECCC are responsible for being affected.

RB - could include preamble in the EEE to outline process that would take place if DAS is pursued as an option for the project.

- if DAS were going ahead, would ECCC still be making determination. If not, what happens if the DAS is done later? TG - ECCC would make a determination after the EEE if an application was made for DAS at a later date. ECCC would make a determination at the time the DAS is known. Transport Canada would not amend their Section 67 determination, but would add ECCC input to it. Other FAs may need to adjust their determination as well.

**Action:** ECCC and TC to clarify with other federal agencies on the process for amendment of the EEE if federal permit applications are needed after the Section 67 determination.

TG – harbor porpoise are DFO's responsibility. NP - Aquatic effects evaluation has included an assessment of harbor porpoise. survey DAS area – good idea. Data is from Stantec in 2011. Not that RTI views it this way, but Aurora assumed that animals would move to side. For RTI, if there are toads, would be constrained due to development.

**Action:** NP and/or MB to share ECCC's technical comments with the RTITC.



C. Comments and Response Table

NP - anonymized table of comments was circulated to RTITC but does not include FA comments. The table was generated from the December RTITC comment and the 30 day public comment period inputs.

NP - as comments come in these can be added to the table.

Discussion from TTITC that the table should include FA comments as well.

**Action:** NP to update comment table with FA comments that will not be anonymized.

Discussion that written comments are important in the process and items discussed in the meeting may not always translated correctly. There is an expectation that the FA's will submit comments regardless of what is discussed at the technical meetings. Noted that the turn around for the comments on the EEE to come in and be addressed is very quick if the next meeting is scheduled for March 18, 2019.

Question was raised whether any public comments will could result in a change to the EEE. NP reviewed public comments with RTITC, which will be summarized in the EEE, but are characterized as minor. Suggested that we don't have the meeting until comments are complete and RTITC has five business days to review. It was noted that this may not be enough time as March is a very busy time with the Nations.

NP – There have been changes to the EEE in fact DAS, for example, has changed a lot.

DD – if some dismissed these could raised at the meeting to offer information to help understanding.

– did send a letter on March 5th. Have these comments been factored in. NP – No but they will be added to the table of comments.

NP – noted that peoples' schedules are constrained, so tried to pre-load the process by submitting early versions of EEE for context and understanding. The appendices were also provide to early to solicit input and build understanding of the material.

NP - We do want this input

DD – there is a chance to discuss these comments today. NP - asks that focus on EEE, then look at plume memo shared on 22nd. NP – doesn't see much change to Plume memo as it is a technical piece.

The committee noted that there seems to be a rush to complete the EEE. MGB – noted that there have been ten meetings to date since April 2018 and have largely covered off all topics, concerns. Meetings, communications almost monthly. RTI feels that RTI created an open transparent process. Understands FA, FN crunch but wants everyone to work together on big issues. Thus, will be very helpful to get responses from technical people.

**Action:** Michelle to take message of timing challenge of RTITC back to senior management at RTI.

DD - best way to address flaws in the EEE is to discuss areas that are creating the greatest concern.

D. High – Level Review of EEE

*Section One*

Mainly editorial. Added extension out to Triple Island. Added regulatory context section. Added section on how constitution Section 35 feeds into the process. TC - flagged to make sure that due to the sale process need to ensure that if sold name of the project would change to reflect. TC language changed to refer to changes in Navigation Protection Act.

**Action:** NP tighten up words. More that the rights determination process is outside of the process. TM - doesn't want to propose something. Are we still open for comments since the thirty days is done. NP - OK. Comments are still coming in. TC - suggest that Hemmera develops or creates language. NP - will also seek legal input. NP – current version is likely updated already.

*Project Description*

**Action:** NP to incorporate this content into EEE. Add this into Appendix on Navigation and Safety section.

KI - federally-regulated railways - questions may have to do with federally regulated railways and where transitioning into private owned infrastructure. Like Ridley, this is different jurisdiction. If switching on federally regulated lands this is federal jurisdiction. KI - [REDACTED] Surface Branch notes Rail Safety Act applies to federal companies. Where infrastructure is privately-owned then not federal. Understands that rail on Ridley is private so not federally-regulated. KI - [REDACTED]

**Action:** KI to clarify and advise [REDACTED]

*Section 3 – Public and Stakeholder*

Section 3.1 - dates inserted, updates made. Open Houses described. High-level results added.

**Action:** NP to add public comments to table 3.1.

*Section 4.0 Aboriginal Engagement*

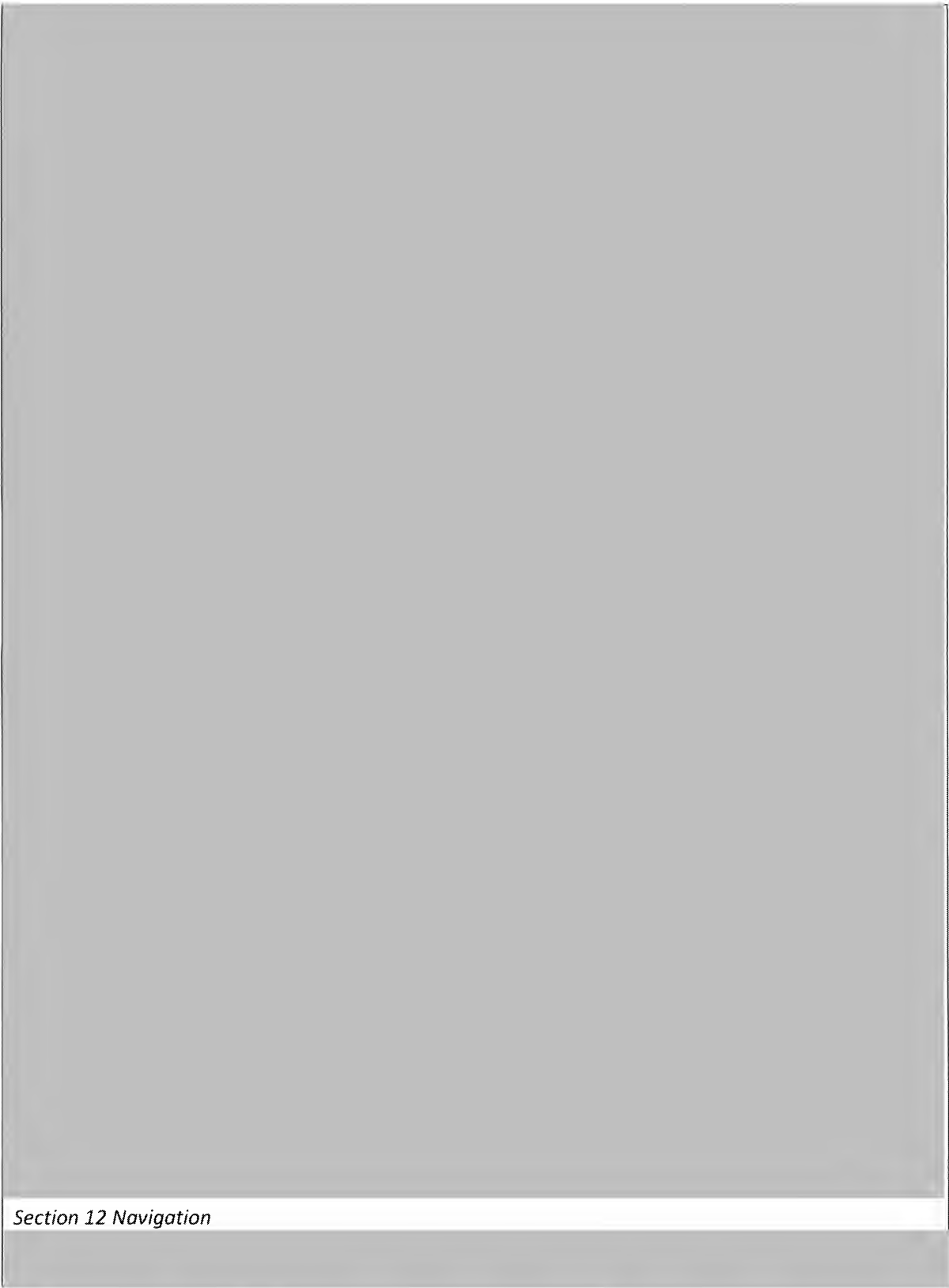
Information removed to match previous document. Rest mostly editorial. Summary of meetings to date added. 4.2 - topics table updated and put in categories and cross referenced to communities. NP - hope this was revised appropriately. Remaining response sections will need to be updated based on final outcomes of the process.

*Section 5 Regulator Engagement*

Outline mirrors previous section. Comments summarized by topic, FA (Table 5.1) added. Responses needs to be updated

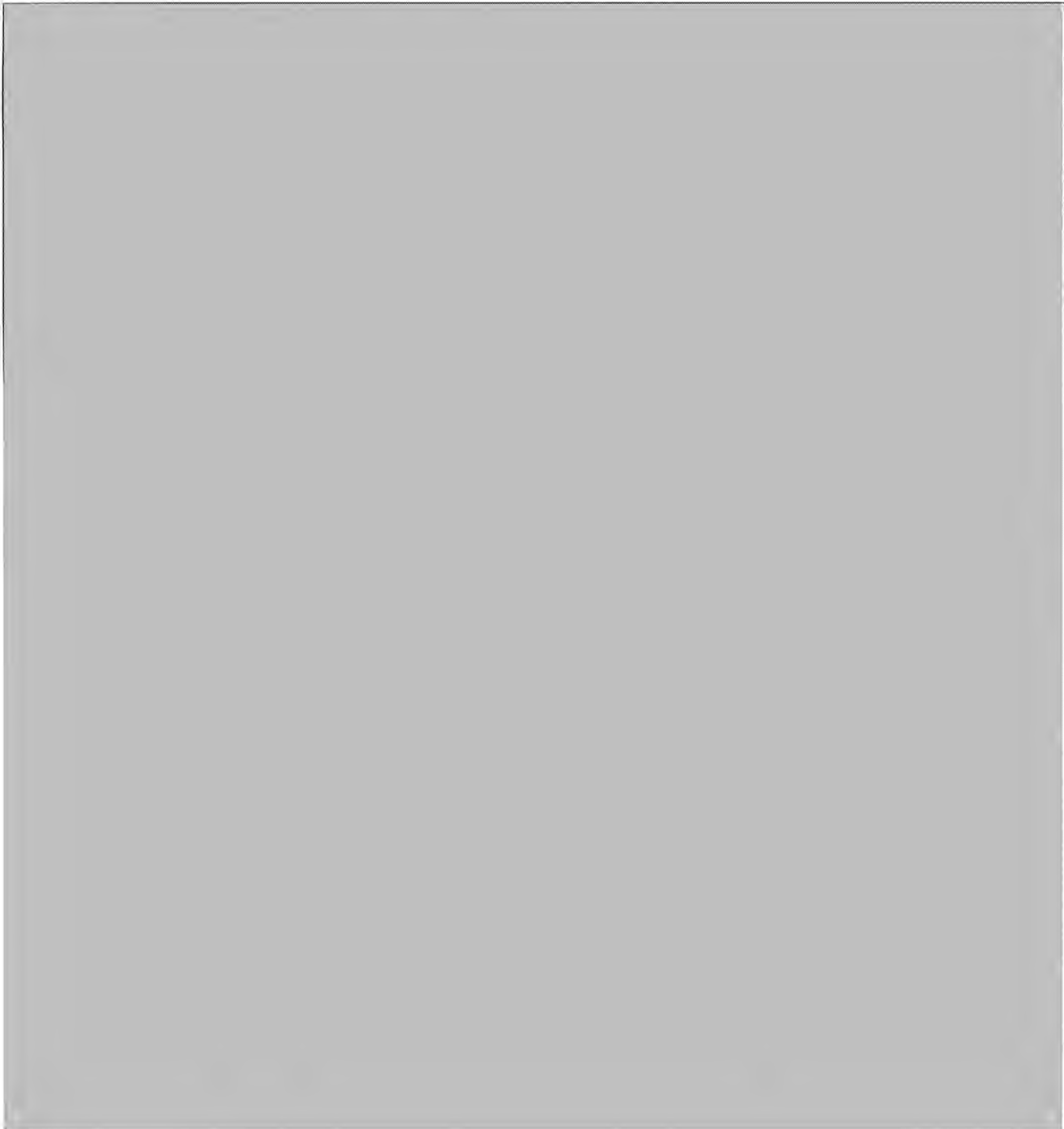
<b>Action:</b> NP update table with responses – 5.2.1.
<i>Section 6.0 Valued Components</i>
<i>Section 7.0 Evaluation Methods</i>
<i>Section 8.0 Marine Mammal</i>

Section 9.0 Marine and Anadromous Fish	
Action: NP	
Section 10 Marine Birds	



*Section 12 Navigation*

Ridley Terminals Inc. Technical Committee



*Section 14 Wetlands*



*Section 18 Accidents and Malfunctions*

*Section 19*

Closing Discussions

Still receiving comments. The final version of the EEE is targeted for March 15, 2019.

**Action:** Include FA comments and additional FN comments in the tracking sheet, prepare responses, and share with RTITC. ECCC comments later this week.

wants to see responses to FA comments.

**Action:** NP will send comments and responses out by email. Aim to have responses to TC comments by Monday or Tuesday (March 11<sup>th</sup> and 12<sup>th</sup>).

TC and ECCC's comments will be submitted later this week and/or early next week.

MBG - still needs to know who in the First Nations he can contact to have these bi-lateral discussions.

Community Contacts for Discussions

interest is in seeing the final EEE and then to write a response report.



Ridley Terminals Inc. Technical Committee

KB - need to review Appendices. Better to focus on those than body of EEE. Lots of changes done. These are positive changes but need to finish these docs reviews. Would rather

NP - in effort to get final, next doc will be final draft. If we can complete the work outside, do we need to do as a committee in a meeting? Consensus that a face to face meeting would not be productive at this stage. would like to know what the FAs see in their determination.

E. Next Steps

March 18 meeting no necessary. Better time spent reviewing document and finishing EEE.

There is a desire to discuss follow-up programs and "Lessons Learned" from this process.

**Action:** NP to create a schedule for next few weeks including when comments will be submitted abd responses. MGB – RTI's Team will get responses back as quick as possible. When you get your responses, please arrange a call with RTI to address the responses if there are any concern that are not adequate.

KI – noted that if there is a desire to meet face-to-face to advise if a meeting is pre-or post April 1st.

**Action:** DD to schedule next meeting, if required.

**MATERIALS DISTRIBUTED AT THE MEETING**

- No materials distributed at the meeting.

**Pages 1340 to / à 1343  
are withheld pursuant to section  
sont retenues en vertu de l'article**

**19(1)**

**of the Access to Information Act  
de la Loi sur l'accès à l'information**

## Nutton, Byron

---

**From:** Olson, Charlotte <Charlotte.Olson@portvancouver.com>  
**Sent:** 2019–March-18 9:02 AM  
**To:** Nutton, Byron  
**Cc:** Ruffo, Gord; Scott Northrup; Thorpe, Suzanne  
**Subject:** Additional Information for Maplewood - Design Report and IFT DWGs - Email 1

Good morning Byron

To follow up on our discussion last Thursday, I am directing you to the following report link:

<https://www.portvancouver.com/wp-content/uploads/2018/08/Attachment-01-MMRP-Habitat-Design-60P-Design-Report-July-2018.pdf>

- **60% Design Report for the Maplewood Project** – which was included as Appendix K to the February 2018 Centerm Expansion Project *Fisheries Act* Application
  - See Section 2.6.2 which includes engineering/coastal modelling information related to the anticipated Tidal Flushing improvements as a result of implementing the Southwest Channel

In a separate email – and due to the large file size, I will also be providing you with the final Issued for Tender (IFT) Drawings that have been prepared for the Maplewood Project – the drawings depict the additional design features that are included in the Southwest Channel to support productive habitat.

**I would also like a quick call today to discuss the following:**

1. VFPA would like the opportunity to revise & resubmit the Maplewood Project Confirmation, to address your comments received last week
2. VFPA would like the opportunity to meet again with you in the next 10 days, to present our approach – and to discuss next steps

Is there any time today that does not work for a quick call? Otherwise, I will try to track you down on your mobile.

Thank you, Charlotte

**Charlotte Olson** P.Geo., PMP  
Manager, Infrastructure Habitat Development



**Vancouver Fraser Port Authority**  
100 The Pointe, 999 Canada Place  
Vancouver, B.C. Canada V6C 3T4

P: 604.665.9590 | CELL: 604.349.4111  
[portvancouver.com](http://portvancouver.com)

# Maplewood Marine Restoration Project

Habitat Design - 60% Design Report

Vancouver Fraser Port Authority

Project number: 60568791

July 2018

## Quality information

Prepared by

Checked by

Approved by

Othman Alfaseeh  
Project EngineerRavi Chatterji, PhD  
Senior Aquatic EcologistNeil Snowball, P.Eng.  
Design Manager

## Revision History

Revision	Revision date	Details	Authorized	Name	Position
5	2018-07-30	Issued for PER		N. Snowball	Design Manager

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	X	Vancouver Fraser Port Authority

**Prepared for:**

Vancouver Fraser Port Authority

**Prepared by:**

Othman Alfaseeh  
Project Engineer  
T: 604-444-6590  
E: othman.alfaseeh@aecom.com

AECOM Canada Ltd.  
3292 Production Way  
Suite 330  
Burnaby, BC V5A 4R4  
Canada

T: 604.444.6400  
F: 604.294.8597  
aecom.com

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## 1. Introduction

This Design Report summarizes the work undertaken to date to develop the Maplewood Marine Restoration Project (MMRP, or "Site"), to the 60% design development stage.

Construction methodologies discussed in this Design Report represent anticipated methods that may be employed in the construction of the MMRP, and may not represent the construction means and methods employed by the eventual contractor engaged to undertake the work.

### 1.1 Background and Site Overview

The Site is located on the north shore of the Central Harbour of Burrard Inlet, approximately 3.0 km east of the Ironworkers Memorial Bridge and Second Narrows (**Figure 1**). It lies within a large marine tidal area immediately south of the Maplewood Flats Conservation Area. The Site has been heavily affected by dredging, gravel extraction, logging operations, and industrial use, and comprises two distinct basins: a Main Basin approximately 12.5 ha in area and a smaller Northeast Basin approximately 5 ha in area (**Figure 2**).

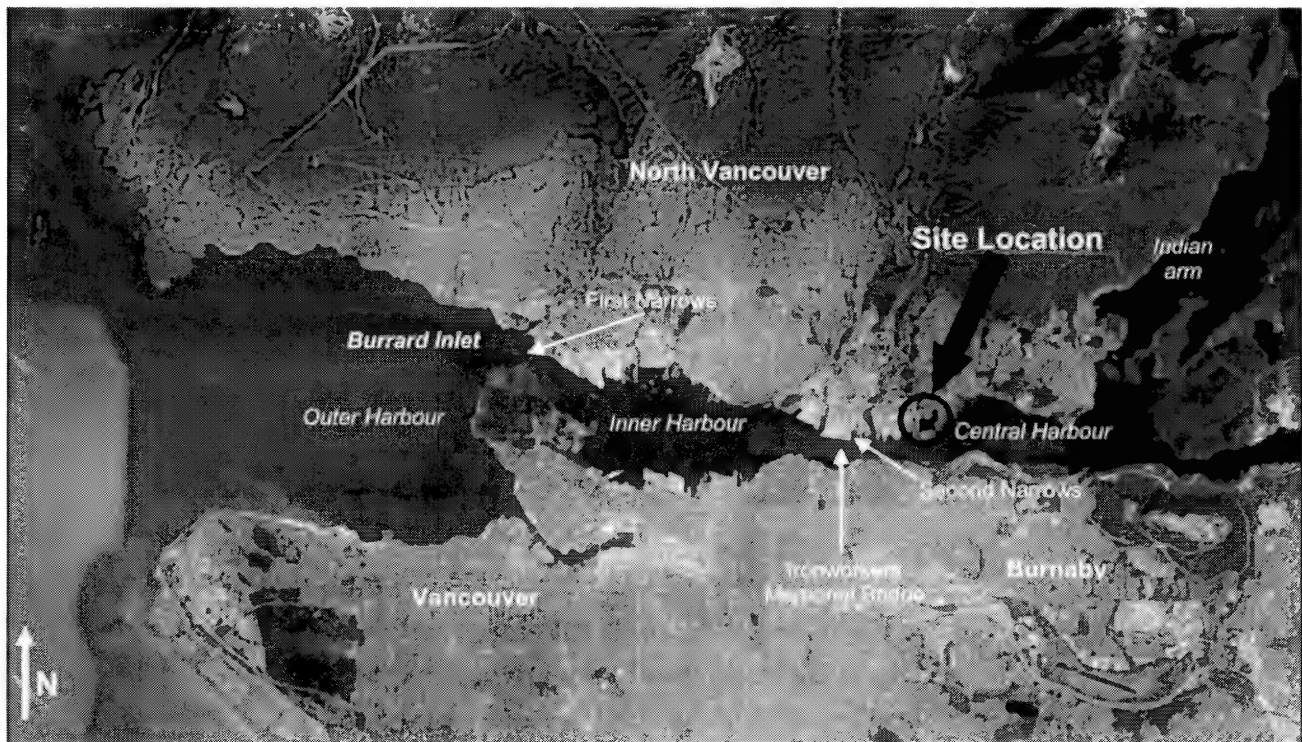


Figure 1 - Site Location

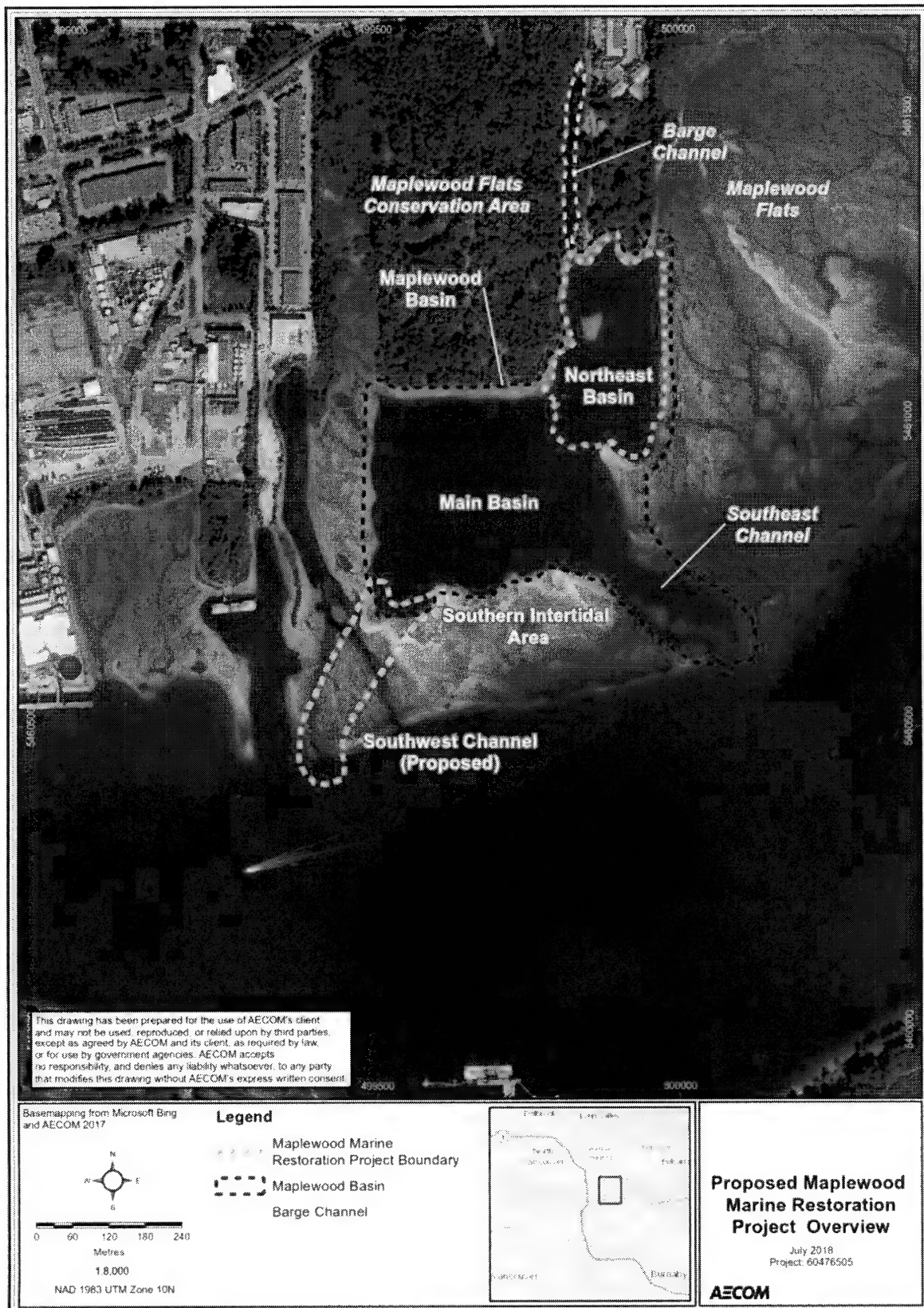


Figure 2 - Maplewood Marine Restoration Project Overview

## 1.2 Historic Context



Figure 3 - Historic Use - 1926



Figure 5 - Historic Use - 1957



Figure 4 - Historic Use - 1979



Figure 6 - Historic Use - 1991

The industrial history of the Site and existing ecological conditions were previously reported by Hemmera Envirochem, Inc. (Hemmera 2015), and again in 2017 by Balanced Environmental (Balanced 2017). The Site was historically an expansive intertidal flat that was heavily disturbed through industrial activity. **Figure 3 to Figure 6** above, show the changes in this area over the previous century. As a result of its industrial past, the Maplewood Basin is relatively isolated with some areas being poorly flushed (with residence time of up to 17.1 hours), and provides low value with low diversity and abundance of marine life (Dungeness crabs, plumose anemones, and ochre sea stars predominate). The basins are dominated by fines (with substantial amounts of high wood debris present in the Northeast Basin) (Hemmera 2015).

## 2. Design Criteria

In the following section, the design criteria established during the initial stages of the design development, as well as design methods and development processes have been recorded. These criteria inform the development of the MMRP.

### 2.1 Project Datum

All geographical data is referenced to the following datums:

- Horizontal Grid: VFPA Survey Grid (UTM NAD 83 Zone 10);
- Vertical Datum: Local Hydrographic Tide and Chart Datum: EL. 0.0 m Chart Datum (CD) = EL. -2.975 m Geodetic Datum (GD) (VFPA Geodetic Datum is CGVD28 (CGG2005) vertical datum).

VFPA has no published monuments within the vicinity.

### 2.2 Standards, Specifications and Design Codes

Relevant design codes, construction standards, and regulations for the MMRP are summarized in **Table 1** below. The version of any design code, standard or regulation applicable to the MMRP is that which is in force on December 1, 2017.

**Table 1 - Summary of Relevant Design Codes and Standards**

Subject	Design Code, Standard, Specification
Coastal Engineering	Coastal Engineering Manual (US Army Corps of Engineers, 2008)
	Shore Protection Manual (US Army Corps of Engineers, 1984)
Geotechnical Engineering	Canadian Foundation Engineering Manual, 4th Edition (2006)
	BC MoT Standard Specifications for Highway Construction
Marine Works	Environmental Loads: National Building Code of Canada (NBCC)
	PIANC (Permanent International Association of Navigation Congresses) Guidelines and Technical Reports
Ecological / Biological	B.C. Ministry of Environment. 2013. B.C. Species and Ecosystems Explorer
	Fisheries and Oceans Canada (DFO). 2008. Rockfish Conservation Areas - Pacific Region Area 28. Accessed (12 December, 2014)
	Fisheries Information Summaries System (FISS). 2013. 'Fish Distributions Query'. Accessed (24 November, 2013)
	Government of British Columbia. 2012. Biogeoclimatic ecosystem classification subzone map. Accessed (16 October, 2013)

### 2.3 Design Service Life

It is anticipated that the Design Service Life for the MMRP will be a minimum of 50 years, excluding maintenance repairs to slope armouring.



## 2.4 Biological Design Criteria

The MMRP proposes the enhancement of intertidal and subtidal habitat in the Northeast Basin of the Site through development of three habitat types. In addition, the MMRP will enhance habitats in the Southwest Channel (**Figure 7**). The habitat types, and their ecological benefits, currently proposed include:

- **Intertidal flat habitat** to support colonization by bivalve shellfish and other infaunal and epifaunal macroinvertebrate CRA fishery species.
- **Shallow subtidal eelgrass habitat** to provide nursery habitat for CRA fishery species (e.g., Dungeness crab and Pacific salmon).
- **Rocky reef habitat** to support broad-bladed kelp and encrusting or colonial invertebrates, and to provide habitat and food for a variety of CRA fishery species (e.g., lingcod).

Intertidal flats and subtidal eelgrass habitat will be created by increasing the elevation of an existing subtidal area of the Northeast Basin. Eelgrass provides a number of known benefits, with its rich, productive habitat for many marine and anadromous species, including nursery habitat for a myriad of fish and invertebrate species. Eelgrass habitat created at the Site will also support cockles (*Clinocardium nuttallii*), butter clams (*Saxidomus gigantea*), geoducks, (*Panopea generosa*), and Pacific littleneck clams (*Protothaca staminea*). In addition to the benefits to CRA fisheries, intertidal flats and eelgrass habitats provide important feeding areas for many bird species that feed on small and juvenile fish, including great blue herons (C. Durance 2017, Precision Identification, pers. comm.). From a physical perspective, eelgrass shoots baffle currents and dampen the effects of waves, preventing or reducing sediment erosion, and providing shelter for fish and invertebrates. The root-rhizome network of eelgrass forms an interlocking matrix that binds sediment, restricts erosion, and assists in stabilizing the seabed.

Rock reef habitat will be created at the toe of the intertidal/subtidal habitat in the Northeast Basin, and within the Southwest Channel. Elevations of reef habitat fall within the Burrard Inlet photic zone<sup>1</sup>, thereby enabling photosynthesis and growth of algae and other marine vegetation.

It is anticipated that rocky reef-macroalgal habitat will increase the availability of refugia, primary productivity, and detrital production at the Site. In addition to the aforementioned benefits to CRA fish species of rock reef habitat, and as described in Bohnsack et al. (1994) and Hueckel et al. (1989), there are known benefits of habitat that form in the areas between and around reef structures. In keeping with these findings, and precedents within Burrard Inlet (Stantec 2017), the recommended reef layout will not be one large, homogeneous structure, but rather a series of smaller units with channels of soft substrate. Retaining this soft substrate will enhance the habitat value further by creating foraging areas for certain species, such as Dungeness crabs and flat fish. It is anticipated that channels created among reef units will improve tidal flushing, thereby increasing food and oxygen availability and light penetration around developing kelp beds. Consequently, the area considered as newly created habitat will not simply be the reefs, but the surrounding channels as well. This "edge" or ecotone habitat is reported to extend from approximately 3 m to 15 m around rock reefs (Bohnsack et al. 1994; Hueckel et al. 1989), while other literature has reported an enhancement to the habitat up to 20 m away (Sargent et al., 2006).

<sup>1</sup> The photic zone within the Burrard Inlet is approximately 12 m deep (Wallen and Geen 1971)



Figure 7 - Proposed Maplewood Marine Restoration Project Habitat

## 2.4.1 Existing Ecological Conditions

Site assessments were conducted to characterize the biophysical environment of the Maplewood Basin and surrounding habitats. In the fall of 2017 a biophysical assessment was undertaken with the goal of documenting substrate composition, marine species abundance and distribution, and general ecological conditions. Surveys were conducted from October 18<sup>th</sup> to October 20<sup>th</sup> and on October 27<sup>th</sup> 2017 by Balanced Environmental Services Inc. (Balanced), and consisted of both underwater diving surveys and land-based assessments. In 2018, the Existing Ecological Conditions Report for the Maplewood Marine Restoration Project, originally prepared by Hemmera in 2015 (Hemmera 2015) to document biophysical site assessments conducted in 2013, was updated to include biophysical sampling conducted in 2018 within the proposed footprint of the Southwest Channel (Hemmera 2018).

### 2.4.1.1 Methodology

The 2017 biophysical assessment focussed on the Main Basin, the Northeast Basin, the existing Southeast Channel, and the area southwest of the Main Basin extending into the Burrard Inlet channel (see **Figure 2**). The survey methods consisted of underwater diving surveys, land-based assessments, visual observation and benthic infaunal sampling.

The assessment was conducted along 14 pre-determined transects throughout the basins, the Southeast Channel, and the area southwest of the Main Basin. All transects were placed generally perpendicular to the dredge basin slopes to include habitat variability at different depths. Benthic infauna samples were also taken at twelve locations within the Maplewood Basin.

Transects captured elevations that ranged from the highest extent of the intertidal zone to the bottom of the dredged basins, with a total range spanning +5.0 m CD to -7.0 m CD. Divers traversed the underwater portions of transects, while transect areas exposed during low tide were assessed on foot. Along each transect the following information was recorded:

- Surficial substrate composition and relative cover along each transect.
- Vegetation species composition and percent areal coverage along each transect.
- Faunal composition and abundance (measured as percent areal coverage or number of individuals observed) along each transect.
- Changes in general habitat characteristics (e.g., presence of wood debris).

Four drop dives were conducted to provide additional information about the biota and substrates in the central portion of the Main Basin and confirm conditions were similar to those of the fourteen transects. In addition, incidental observations of other biota, surficial substrate composition, and habitat characteristic were noted when moving between transects.

Benthic infauna sampling was conducted at 12 sites located throughout the Maplewood Basin on October 27, 2017. Four sites were located around the perimeter of the Northeast Basin, six in the southwest of the Site, one on the eastern boundary of the Main Basin, and one on the west side of the existing Southeast Channel. The upper 10 cm to 15 cm of fine substrate was sampled using a diver-operated box sampling device. Samples were returned to the surface and processed through sieves. Bivalve species composition and abundance were recorded at each site.

Locations where Hemmera (2015) identified high-value habitat by visual observations during 2013 field studies were re-assessed by Balanced in 2017. The reassessment included updated observations of:

- An eelgrass (*Zostera marina*) bed of approximately 300 m<sup>2</sup> in the channel at the southeast of the Site that connects the basins with the Burrard Inlet.
- An eelgrass bed of approximately 10 m<sup>2</sup> at the north end of the Main Basin.

- A sugar kelp (*Saccharina Latissima*) bed of approximately 7,000 m<sup>2</sup> at the southern edge of the Main Basin.

The areal extents of the high-value areas were measured by divers by either recording locations of marker buoys at each end of the habitat patches with a GPS device and then measuring representative widths across the patch, or by directly measuring the patch extent with underwater measuring tapes (in the case of the smaller eelgrass bed). Density, health, growth characteristics, and biota abundance were assessed within quadrats placed along dive transects that intersected the high-value areas. Water depths were recorded throughout these habitat areas. Representative underwater Site photographs were taken at each of the high-value areas.

#### 2.4.1.2 Results

##### Physical Conditions

Intertidal physical conditions at the Maplewood Basin vary considerably. Intertidal habitat varies in width, gradient, and substrate size, but is generally characterized by coarse and fine gravel substrate, with some areas of sand.

A dredged, tidally-influenced channel is located in the northwest corner of the Northeast Basin. Locally known as the "Barge Channel", this brackish channel receives freshwater inputs from an ephemeral watercourse located north of Dollarton Highway, and conveyed under the roadbed through a culvert. Freshwater discharge from this ephemeral watercourse mixes with stormwater and groundwater from upslope areas and saltwater during periods of high tide (McElhanney 2016). Freshwater and saltwater used for scientific studies are also discharged into this channel from the Environmental Climate Change Canada (ECCC) Pacific Environmental Science Centre (G. Van Aggelen 2017, pers. comm.).

Surficial sediment composition varies throughout the Maplewood Basin (Hemmera 2015 and 2018, Balanced 2017, KCB 2018) and included:

- Northeast Basin:
  - Northern edge: gravel and cobble band with small quantities of concrete debris.
  - Western edge: boulders and concrete debris.
  - The eastern and southern edge: coarse and fine gravel substrate, with patches of sand and shell hash.
  - Near the base of the dredge cut slopes, accumulations of woody debris and bivalve shells were observed.
  - Deeper, subtidal areas are dominated by fine sand and silt, with accumulated woody debris present.
- Main Basin:
  - Northern edge: coarse cobble and gravel, with patches of boulder and concrete debris.
  - Eastern western and southern edge: cobble, gravel, and sand, with bands of shell hash.
  - Substrates decrease in size with increasing depth. Fine sand and silt are the dominant substrates at the bottom of the dredge area (-5.0 m to -8.0 m CD) and beyond.
- Southwest Channel:
  - The Southwest Channel will be dredged through a low intertidal area (Southern Intertidal Area, **Figure 2**) located between the Main Basin to the north and the main channel of Burrard Inlet to the south. The Southern Intertidal Area consists of various mixtures of cobble, gravel, sand, and shell hash throughout its intertidal zone.
  - At the southern edge of the Southern Intertidal Area, the elevation decreases and cobble and gravel cover a sandy, current-swept bottom from 0.0 m to -10.0 m CD.

Sediment cores analysed by Hemmera (2015) indicated that sediment texture across the Maplewood Basin ranged from silt to sandy substrate, depending on depth and location.



## Biological Conditions

### Vegetation

The Maplewood Basin and surrounding Maplewood Flats support a moderate variety of vegetation. In the Northeast Basin vegetation includes sugar wrack kelp, rockweed (*Fucus gardineri*), Turkish washcloth (*Mastocarpus papillatus*), and iodine seaweed (*Prionitis lyallii*) where coarse substrate provides adequate attachment sites; however, the overall abundances of vegetation was considered low, with most species classed as sparse or rare (FREMP 2013; Hemmera 2015 and 2018; Balanced 2017). Diversity of vegetation in the Main Basin is also considered moderate, with eelgrass, sugar wrack kelp, rockweed, red fringe (*Smithora naiadum*), red spaghetti (*Gracilaria* sp.), and Turkish washcloth present; however species densities are considered low (FREMP 2013).

The most abundant algal species found in the Main Basin was sugar wrack kelp, with a fringing bed present at southern edge of the main basin between 0.0 m and -5.0 m CD. Sugar wrack kelp abundance was rated as 'common' in an area of approximately 3,010 m<sup>2</sup> along the southern edge of the basin and 'sparse' or 'rare' elsewhere along the Main Basin dredge slopes. Silt was noted to have accumulated on the fronds of this sugar wrack kelp (Hemmera 2015 and 2018, Balanced 2017), suggesting low levels of flushing and high tidal residence times. Eelgrass identified in the Main Basin consists of two small patches along the northern shoreline between 1.0 m and -2.0 m CD, with a total area of approximately 10 m<sup>2</sup> (Hemmera 2015 and 2018, Balanced 2017). A second area of eelgrass approximately 250 m<sup>2</sup> in size was identified in the existing channel to the southeast of the Main Basin (Balanced 2017).

In the intertidal zone near the Southwest Channel, Turkish washcloth was found scattered amongst the cobbles and sand. Sea lettuce (*Ulva fenestrata*) is abundant in large patches along the eastern and outer shorelines at mid-intertidal elevations.

At subtidal elevations on the south side of the Southern Intertidal Area, there were winged kelp (*Alaria esculenta*), sugar wrack kelp, bull kelp (*Nereocystis luetkeana*), red spaghetti, Pacific rose (*Rhodomenia pacifica*), and iodine seaweed. A low-density bull kelp patch, with an area of approximately 550 m<sup>2</sup>, was found along the western margins of the southern slope of the Southern Intertidal Area (from -1.0 m to -3.0 m CD). Bull kelp density within the patch was estimated at less than 1 stipe/m<sup>2</sup>.

### Fish and Invertebrates

Though highly industrialised, Burrard Inlet is known to support a wide diversity of fish species. Nearshore habitat at the Northeast Basin has the potential to support fish known to use the nearshore habitat of the Burrard Inlet, including lingcod (*Ophiodon elongatus*), rockfish (*Sebastes* sp.), juvenile Pacific herring (*Clupea pallasii*), and various salmonids. Listed species with the potential to inhabit the Northeast Basin are coastal cutthroat trout (*Oncorhynchus clarkii clarkii*) and bull trout (*Salvelinus confluentus*) (Hemmera 2015 and 2018). Green sturgeon (*Acipenser medirostris*), while potentially present, are considered unlikely to be found at the Site. Due to the limited availability of coarse substrates, vegetation, and food sources in the Northeast Basin, habitat quality for these fish species is considered to be poor. The Barge Channel has habitat characteristics that may be suitable for juvenile salmonid use, and anecdotal evidence suggests juvenile chum salmon have historically used the Barge Channel (Capilano College 1994). Though there is hydraulic connectivity with freshwater features north of Dollarton Highway, there is no evidence of salmonid presence upstream of the highway, possibly due to the culvert under the highway representing a barrier to upstream fish migration (McElhanney 2016). Any existing use of the Barge Channel by juvenile salmonids is expected to be supported by the proposed habitat offsetting measures.

The Northeast Basin supports a variety of crustaceans, molluscs, anemones, and sea stars. Intertidal areas in the Northeast Basin were observed to support sessile invertebrates including acorn barnacles (*Balanus glandula*) and bay mussels (*Mytilus trossulus*) on coarse substrates. Other invertebrates observed include dogwinkle snails (*Nucella* sp.), plate limpets (*Tectura scutum*), green shore crabs (*Hemigrapsus oregonensis*), and purple shore crab (*Hemigrapsus nudus*) (Balanced 2017). Subtidal areas of the Northeast Basin support sessile invertebrates include acorn barnacle and giant plumose anemone (*Metridium farcimen*). Crab of several species, are present but the abundance of each was estimated to be sparse or rare. Mounded burrow openings, typical of ghost shrimp, and retracting bivalve siphons were observed in the Northeast Basin. Two finfish species, scalyhead

sculpin (*Artedius harringtoni*) and saddleback gunnel (*Pholis ornata*), were also observed. In conclusion, the Northeast Basin offers minimal habitat for finfish and macroinvertebrate species. This is evident by the rare observations of finfish in the Northeast Basin and low macroinvertebrate abundances (most species were classed as sparse or rare). The wood debris accumulation on the Northeast Basin floor is considered to adversely affect habitat quality and productivity, thereby contributing to the low abundance of fauna and flora.

The Main Basin support invertebrates, including acorn barnacles, bay mussels, dogwinkle snails, plate limpets, green shore crabs, and purple shore crabs (Balanced 2017). Sessile invertebrates observed include giant plumose anemone. Dungeness and graceful crabs are present but were estimated to be sparse or rare in abundance. Bivalve species observed with abundances of rare to sparse. Black-eyed Goby (*Coryphopterus nicholsi*) and scalyhead sculpin were observed during reconnaissance surveys, although their abundances were rated as rare (Balanced 2017). Benthic sampling in the northeast corner of the Main Basin yielded juvenile butter clam, littleneck clam, macoma clam, manila clam, and Nuttall's cockle. Similar to the Northeast Basin, nearshore habitat of the Main Basin has the potential to support fish that typically use nearshore habitat of Burrard Inlet as a whole; however, due to the limited availability of coarse substrates, vegetation, and food sources in the Main Basin, habitat quality for these fish species is considered poor.

In the intertidal zone near the Southwest Channel, sessile invertebrates include acorn barnacles, bay mussels, and Pacific oysters (*Crassostrea gigas*). Purple and green shore crabs were common throughout the intertidal zone. Three species of sea star were also found: leather (*Dermasterias imbricata*), mottled (*Evasterias troschelii*), and ochre (*Pisaster ochraceus*) (Balanced 2017). While the Southern Intertidal Area offers relatively productive habitat when compared to the Main Basin and Northeast Basin, the area through which the Southwest Channel is proposed to be dredged has low invertebrate abundance, with most species classed as sparse or rare (Balanced 2017).

Tsleil-Waututh Nation provided information on the bivalve community in the Southern Intertidal Area, including commenting on the presence of horse clams (also known as fat gaper clams; *Tresus capax*) and butter clams (John Konovsky, Tsleil-Waututh Nation 2017, pers. comm.). Benthic substrate sampling in the Southern Intertidal Area (i.e., within and around the proposed Southwest Channel) yielded butter clam, littleneck clam, macoma clam, manila clam, and Nuttall's cockle, and gaper clam (*Tresus sp.*) (Balanced 2017, Hemmera 2018), with juvenile macomas and littlenecks being the most abundant.

#### 2.4.1.3 High-Value Habitat Re-assessment

The high-value areas noted in Section 2.4.1.1 were reassessed by Balanced between October 19<sup>th</sup> and 20<sup>th</sup>, 2017. Underwater dive surveys of high-value habitat areas were conducted to assess extent, density, health, and biota abundance.

All three high-value habitat areas were identified at the locations described in Hemmera's 2015 report on existing ecological conditions. The kelp band and smaller eelgrass bed were both located on the dredge slopes of the Main Basin, while the larger eelgrass bed was located in the existing channel to the southeast.

Divers observed that the areal extent of the largest eelgrass bed had reduced in size from 300 m<sup>2</sup> to 250 m<sup>2</sup>. Eelgrass in the northern part of the Main Basin had retained its areal coverage (~10 m<sup>2</sup>). Sugar wrack kelp was present along the Main Basin and Northeast Basin dredge slopes and in the Southeast Channel. Sugar wrack kelp abundance was generally limited to a narrow strip along the basin dredge slopes within the 0 m to -5.0 m CD depth range. The highest density sugar wrack kelp was found in the southeast channel. Patches where sugar wrack kelp abundance was classified as 'common' are present along the southern edge of the Main Basin and the northeast corner of the Northeast Basin. The locations and extents of the eelgrass and macroalgal communities in the Main Basin were confirmed through discussions with Tsleil-Waututh Nation.

A previously un-reported bull kelp bed was observed in Burrard Inlet south of the Site. This kelp bed, (approximately 550 m<sup>2</sup> in area) was determined to have low density of bull kelp (less than 1 individual/m<sup>2</sup>). Therefore, it is classified as a fourth potential high-value location that could be affected by the development of the Southwest Channel, and was therefore mapped and characterized. GPS waypoints were recorded around the outer edge of the portion of the bull kelp patch visible at low tide and a dive transect was conducted across the patch.

Activities associated with the habitat enhancement works are not expected to alter the extent, density, health, and biota abundance of the high-value habitat. On the contrary, improvement to tidal flushing in the Main Basin is expected to reduce the siltation effects currently observed.

## 2.5 Coastal Design Criteria

### 2.5.1 Water Levels

Tidal datums for Burrard Inlet have been established and are publicly available in the Canadian Tide and Current Tables, Volume 5 Juan de Fuca Strait and Strait of Georgia (**Table 2**). These tidal datums were developed from tide observations at the Vancouver harbour tide gauge (Gauge Number 7735) and are applicable to the Site. The conversion from CD to GD is based on information provided by the Canadian Hydrographic Service. **Table 2** below gives the water level elevations for Burrard Inlet in both CD and GD.

Table 2 - Tidal Elevations in Burrard Inlet

Water Level event	Elevation Chart Datum (m)	Elevation Geodetic Datum (m)
Extreme Highest High Water (EHHW)	+5.600	+2.625
Higher High Water Large Tide (HHWLT)	+5.070	+2.095
Higher High Water Mean Tide (HHWMT)	+4.370	+1.395
Mean Water Level (MWL)	+3.020	-0.045
Geodetic Datum <sup>1</sup> (GD)	+2.975	0.000
Lower Low Water Mean Tide (LLWMT)	+1.11	-1.865
Chart Datum (CD)	0.00	-2.975
Lower Low Water Large Tide (LLWLT)	-0.18	-3.155
Extreme Lowest Low Water (ELLW)	-0.40	-3.375

<sup>1</sup> For the Vancouver Harbour area, Geodetic Datum is 2.975 m above CD

Water level data were also downloaded and processed for a data set collected every minute at the Point Atkinson tide gauge (Gauge Number 7795) for two months (March 2016 – April 2017). The numerical model domain boundary was aligned with Point Atkinson. These data are considered representative of typical water level conditions at the Site and are used in the hydrodynamic/sediment transport modeling (see **Figure 8**).

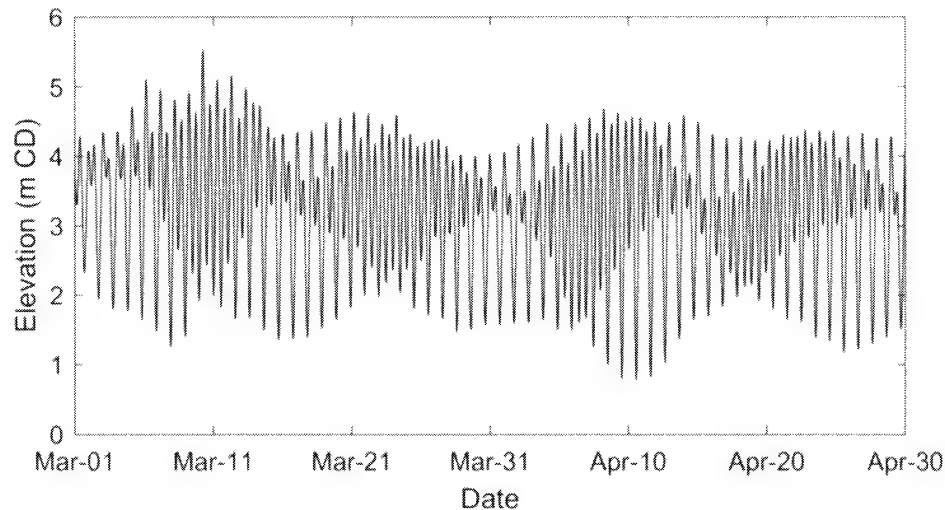


Figure 8 - Two-month record of observed water levels at the Point Atkinson tide gauge (Station 7795)

#### 2.5.1.1 Sea-Level Rise (SLR)

Future Sea Level Rise (SLR) projections are recommended for BC in the Coastal Floodplain Mapping – Guidelines and Specifications technical report. (BC Ministry of Forests, Lands, and Natural Resource Operations 2011). The guidance recommends using a global SLR projection of one meter for the year 2100 (see **Figure 9**). This global projection should be adjusted for local effects, including regional oceanographic effects and local land subsidence or uplift. Additional SLR projections for the Site were obtained from a 2014 Geomorphology Report (NHC 2014).

It is important to clarify that this guidance is typically used for coastal floodplain mapping or in the design of coastal protection structures or other types of structures or features built along the shoreline. The intent of the guidance is to provide design recommendations to prevent future flooding or inundation due to SLR. As this MMRP does not currently include an alteration of the shoreline and bank, the guidance does not directly apply. Furthermore, the target year of 2100 creates a relatively long future horizon for a subtidal habitat restoration design. Unlike hard shoreline structures, subtidal natural features are dynamic and can shift over the long-term. For these reasons, a more detailed investigation of SLR was conducted to determine any potential future impacts to the MMRP. The Coastal Floodplain Mapping – Guidelines and Specifications guidance is summarized briefly here to provide background on how future SLR is typically incorporated into coastal projects within the region.

Globally, SLR is increasing at approximately 1.70 mm/year (NOAA 2017). Different coastlines of the world are subject to various amounts of SLR due to regional oceanographic effects and local vertical land motions. Therefore, the U.S. National Atmospheric and Oceanic Administration (NOAA) also determines relative rates of SLR that have been observed at tide gauges. These relative rates of SLR account for local effects, are site-specific, and can be used in coastal design for each particular coastline. The observed relative SLR rate for Vancouver is much lower than the global rate, at 0.37 mm/year. With a smaller observed rate of SLR than the global average, it is likely that the Vancouver area will be less impacted by SLR than other regions of the coast.

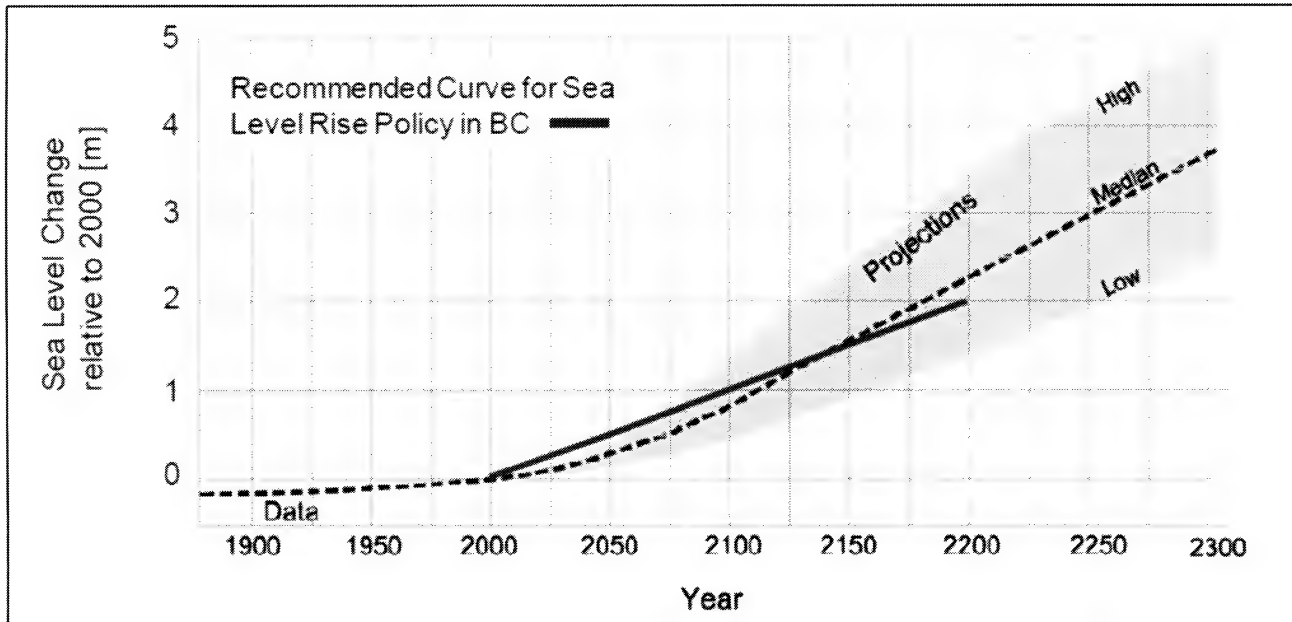


Figure 9 - Global SLR Projections

Current research suggests that rates of SLR will increase in the future (NOAA 2017). NOAA has developed four global SLR scenarios which range in severity (Low, Intermediate-Low, Intermediate-High, and High) and depend on complex future climate scenarios and rates of global greenhouse gas emissions.

The procedures in NOAA (2017) were used and combined the relative rate of SLR of 0.37 mm/yr with the four future SLR scenarios to determine the amount of SLR that could impact the Site in the coming decades (**Figure 10**). **Table 3** shows the specific amounts of SLR predicted for the Site for three future time periods: the years 2030, 2050, and 2100.

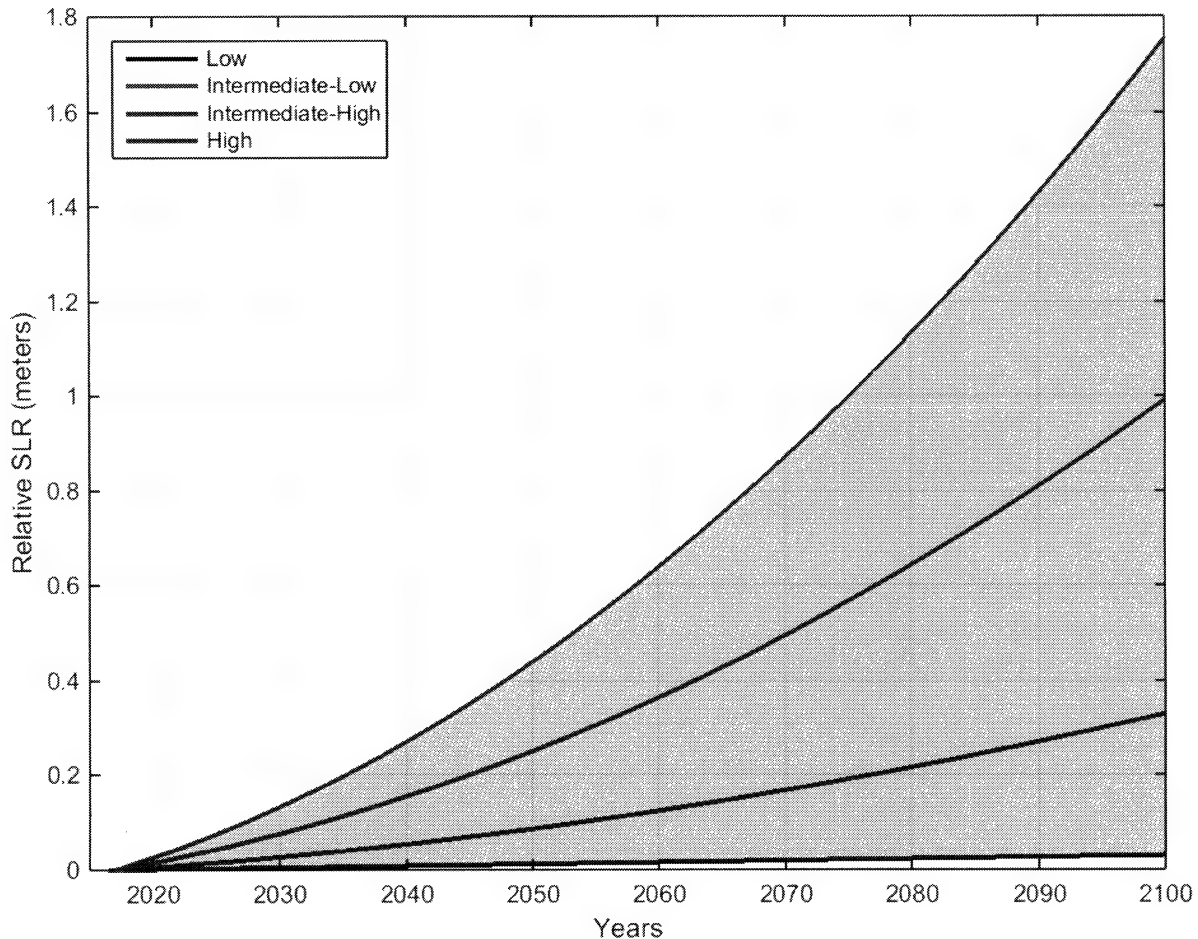


Figure 10 - Relative Future SLR Projections for the Site

The year 2030 is a relatively short design horizon for coastal design and the year 2100 is a relatively long design horizon for coastal design, but these two horizons are included for comparison. The year 2050 creates a more reasonable horizon for coastal design. Furthermore, the Low SLR scenario does not include a future increase in SLR rates and is not a likely SLR scenario (NOAA 2017). Similarly, the High SLR scenario is the result of an extreme global climate scenario and is possible, but not a likely future SLR scenario. These scenarios are included to show the range and uncertainty in future SLR projections. The Intermediate-Low and Intermediate-High SLR scenarios show more moderate increases in SLR and are more likely scenarios at this time. For the year 2050, the predicted SLR ranges from 0.1 – 0.3 m for these two scenarios. This amount of SLR is relatively low and will not likely impact the subtidal habitat. Each proposed subtidal habitat type has a range of target elevations and this small increase in water depth (due to SLR) is not likely to have any significant impacts. Furthermore, these predicted increases in sea level are expected to occur slowly over 33 years, and it is likely that the marine flora and fauna can migrate to shallower areas if needed.

Table 3 - Predicted SLR for the Site for the Years 2030, 2050, and 2100

Year	Future SLR (m)			
	Low	Intermediate-High	Intermediate-High	High
2030	<0.1	<0.1	0.1	0.1
2050	<0.1	0.1	0.3	0.4
2100	<0.1	0.3	1.0	1.8

### 2.5.2 Wind

Winds generate waves that could impact the Site. Although the Site is relatively sheltered, wind-driven waves were analyzed and modeled. Wind data were compiled from two wind stations with publically available data:

- 1) wind station operated by the Canadian Government at the Vancouver International Airport with data managed by Canadian Weather Energy and Engineering Data Sets (CWEEDS); and
- 2) NOAA wind station at the Vancouver Harbour.

The NOAA station is located near the Site (**Figure 11**), but has a relatively short period of record of 14 years (**Table 4**). The CWEEDS station is located further from the Site but has a much longer period of record of 52 years. Data from both wind stations was initially considered for the MMRP.

Table 4 - Details of Wind Data Sources

Station	Period of Record	Latitude	Longitude
Vancouver Harbour (NOAA)	3/1/1980 – 9/11/1987	49.300	-123.117
Vancouver Airport (NOAA)	1/1/1991 – 1/1/2005	49.183	-123.167
Vancouver Airport (CWEEDS)	1/1/1953 – 12/31/2005	49.25	-123.25

Wind rose plots for the two wind stations are shown in **Figure 12** and **Figure 13**. The plots show the distribution of winds by direction during the periods of record. Following a technical procedure described in USACE (2006), the data have been adjusted to hourly average and 10 m wind speeds which are standard in coastal engineering and numerical modeling. The wind patterns at both sites are similar, with a majority of winds and strongest wind speeds coming from the west and east. Maximum wind speeds are from the east at approximately 44 km/h.

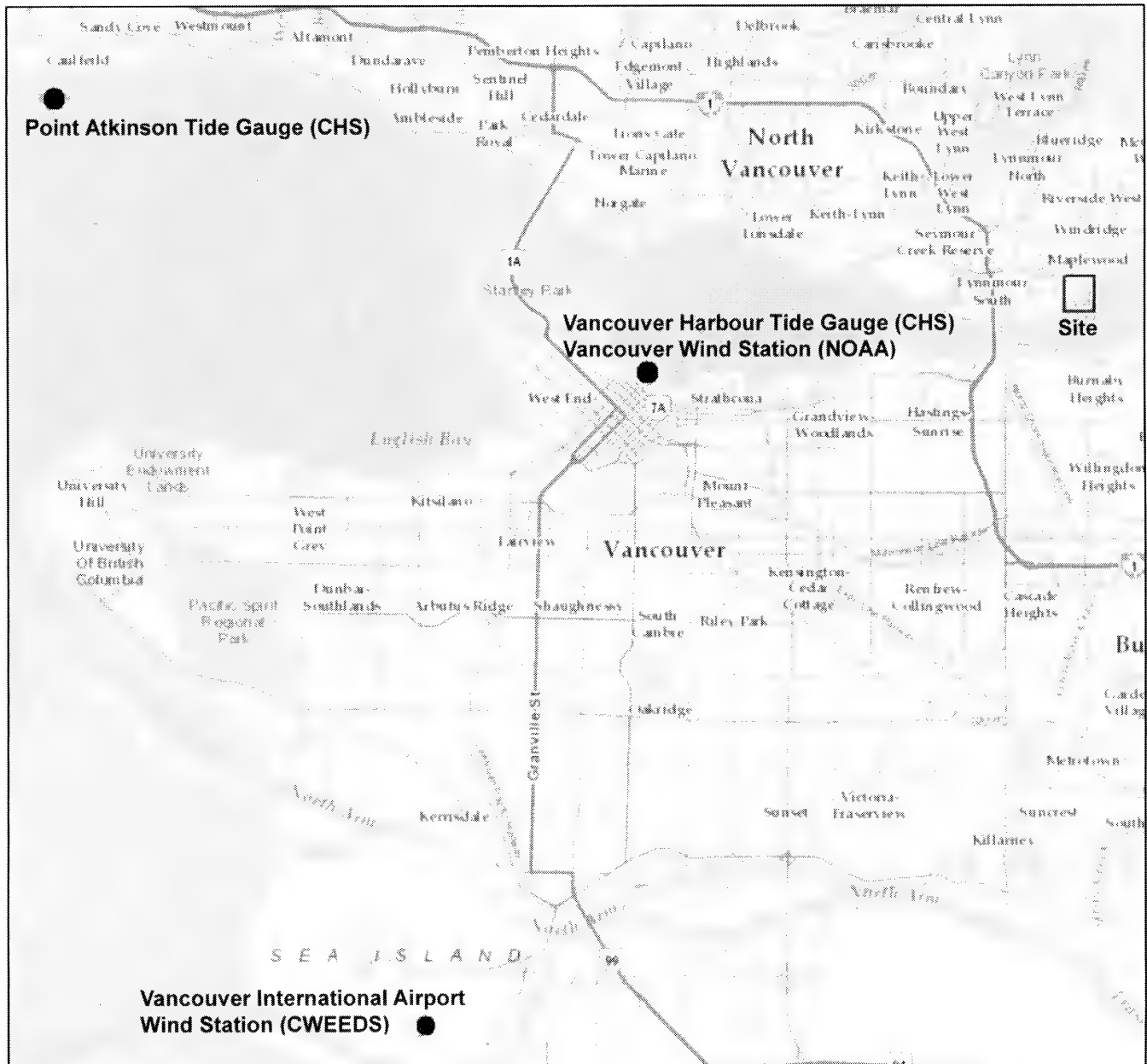


Figure 11 - Wind Station and Tide Gauge Locations



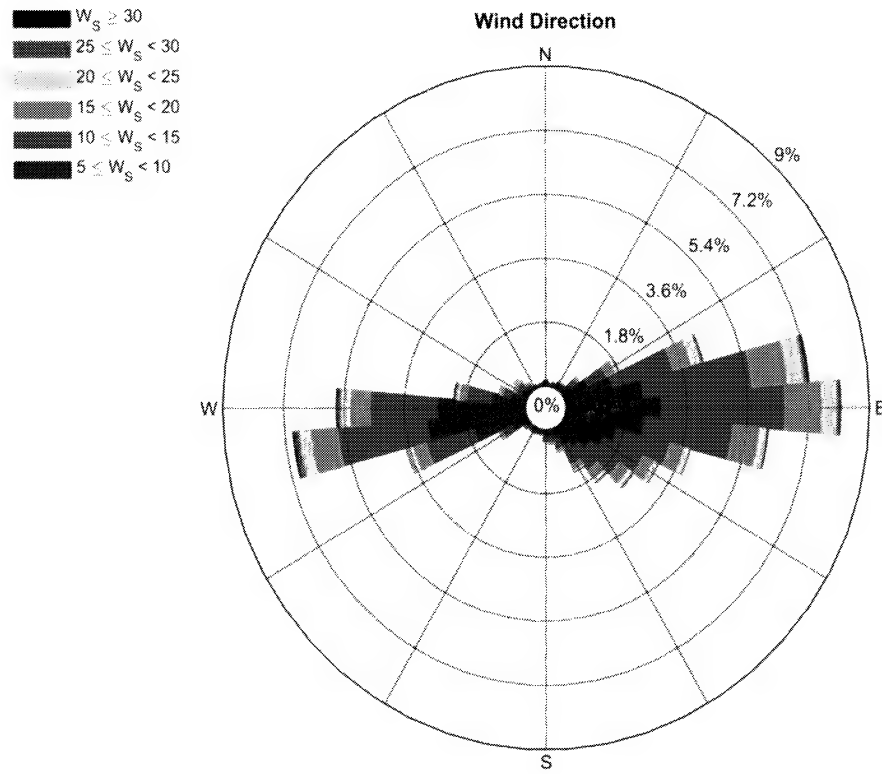


Figure 12 - Rose Plot of Wind Data (in km/hr) collected at the NOAA Vancouver Harbour Station

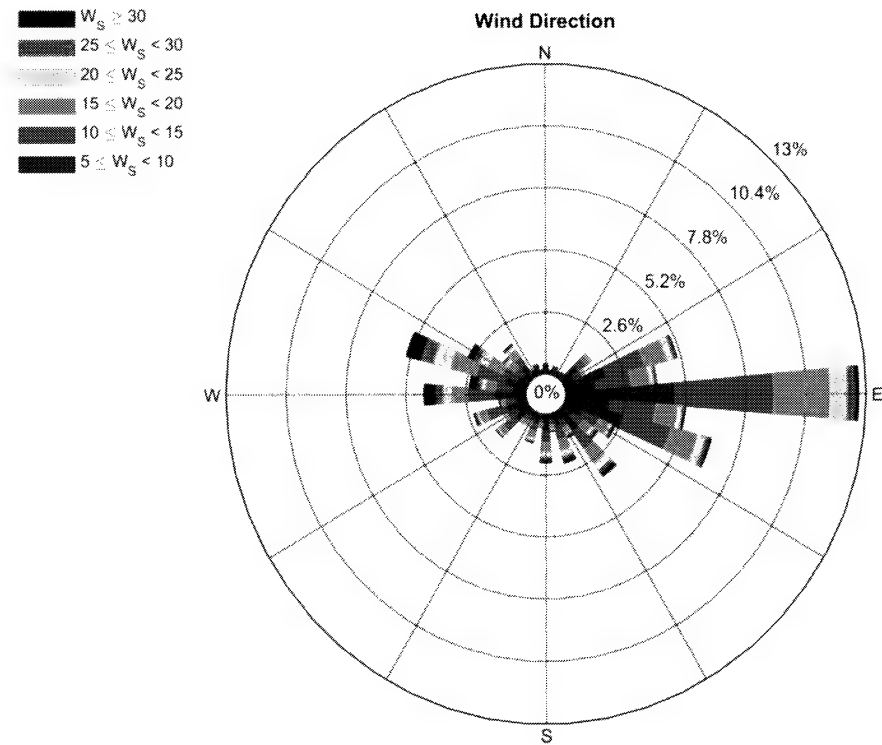


Figure 13 - Rose Plot of Wind Data (in km/hr) at the CWEEDS Vancouver International Airport Station

The Site is relatively sheltered from winds from many directions. The largest wind-fetch (distance over which wind can travel over water to generate waves) is approximately 8.13 km towards the southeast (**Figure 14**). The easterly wind records (i.e., wind observations approaching from 80 – 100 degrees True North) were separated from the entire data set and analyzed. A histogram of the easterly winds observed at the NOAA Vancouver Harbour Station is shown in **Figure 15**. The majority of winds are within 5 – 15 km/h and the maximum hourly average wind speed is 46 km/h.

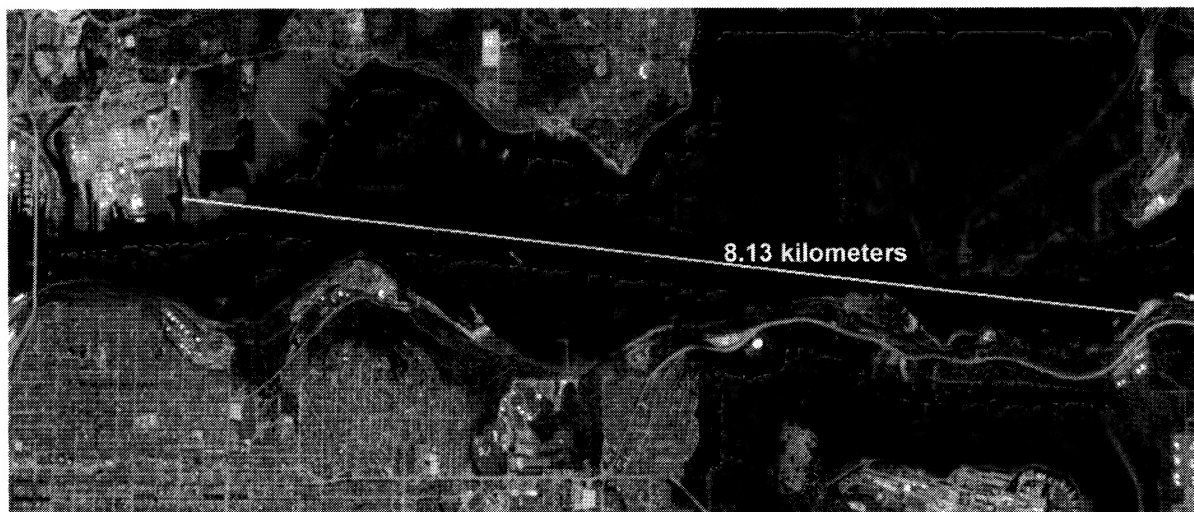


Figure 14 - Largest wind fetch for the Site

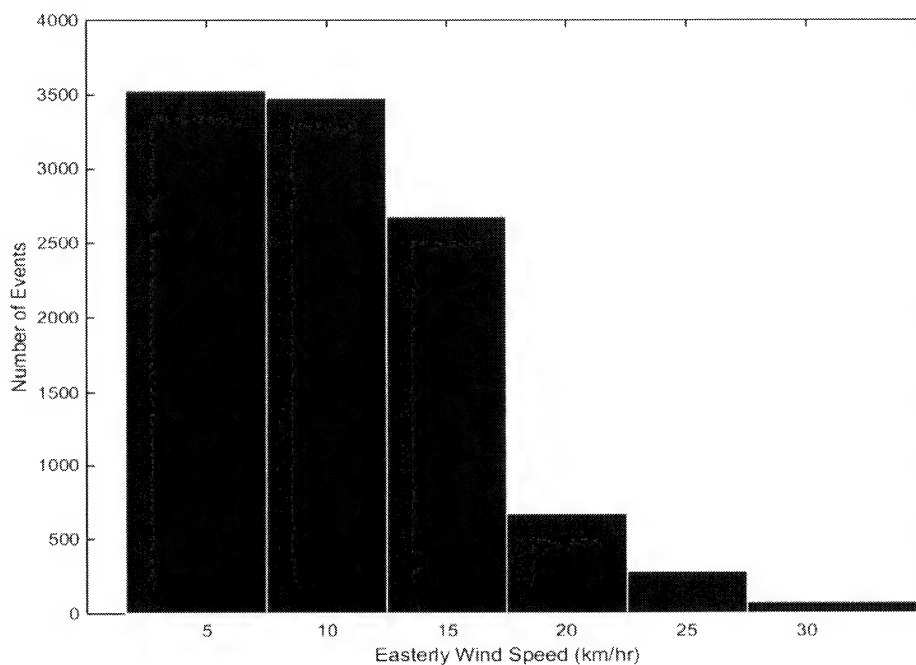


Figure 15 - Wind speeds approaching from the east (80-100 degrees TN) at the NOAA Vancouver Harbour Station.

A statistical extreme value analysis (EVA) was conducted on the easterly winds to determine the wind speeds for various return periods at both stations (**Table 5**). To achieve this, the procedure described in Lund University (2011) for a generalized EVA using the probability of weighted moments method was used; which is standard in coastal engineering and statistical analyses of wind and wave data. The wind speeds for the 2- through 10-year return periods are similar for both wind stations indicating that the winds are fairly uniform over the region.

Subsequent analysis and numerical modeling used the winds from the NOAA Vancouver Harbour station as it is closest to the Site. **Table 5** also shows the percent annual chance associated with each wind speed, which is the probability that the wind speed will be met or exceeded within any given year. Wind speeds at longer return periods have a lower percent annual chance of occurrence. The highest winds speeds are not sustained for long periods of time (i.e., multiple hours) and are typically used for shoreline design and flood control analysis.

**Table 5 - Estimated Wind Speeds for Various Return Periods and Directions (from Mineart 2015)**

Return Period (Years)	Percent Annual Chance (%)	NOAA Vancouver Harbour Winds from 80-100 Degrees (km/hr)	CWEEDS Airport Winds from 80-100 Degrees (km/hr)
Average	--	10.4	12.0
2	50	38.7	38.9
5	20	44.4	43.7
10	10	45.7	46.4
25	4	46.4	49.3
50	2	46.6	51.1
100	1	46.7	52.7

Tsleil-Waututh Nation requested that the MMRP consider incorporating the closest wind station data available and shared technical reports that noted a wind station that was installed near the Site for the Kinder Morgan Westridge Marine Terminal project. The reports note that this station was installed for one year, which is not considered long enough to accurately determine the wind speeds for different return periods (2-, 5-, 10-Year, etc.); however, based on this request, wind data were used from the nearby NOAA Vancouver Harbour wind station. It is also important to note that the distributions in **Figure 12** and **Figure 13** suggest that the winds are fairly uniform in this region such that the use of data from several different wind stations yields similar analysis and numerical modelling results.

### 2.5.3 Waves

#### 2.5.3.1 Wind-Waves

There are no publically available data of wind-generated wave conditions at the Site or adjacent areas within Burrard Inlet (NHC 2014). Previous studies (NHC 2014 and Mineart 2015) calculated and numerically modeled wind-generated wave conditions at adjacent sites within Burrard Inlet. These estimated waves are relatively small because the shoreline is sheltered from several directions and wind-fetches are limited to restrict wind wave generation. The Site is similar and sheltered from several directions and with limited fetch in other directions.

Empirical coastal engineering equations from USACE (2006) were used to calculate the wave heights and periods for the wind speeds at different return periods from the NOAA Vancouver Harbour station (**Table 5**). The results are shown in **Table 6** and indicate that wind-generated waves at the Site are relatively small with short periods. The average wind speed is expected to generate waves with a deepwater significant wave height ( $H_s$ ) of 0.12 m and a peak spectral wave period ( $T_p$ ) of 1.69 s. Winds at longer return periods are also expected to generate small waves with short periods.

The height of wave setup and run-up was estimated at the shoreline using the Stockdon et al. (2006) empirical equation and assuming a shoreline slope of 2% that was cited as a representative beach slope in NHC (2014). Although there is currently no shoreline component to the design, these are included for reference. Wave setup and run-up heights are expected to be small for average wind conditions and wind conditions at all return periods.

Table 6 - Extreme Wind-Generated Wave Conditions for the Site

Wave Characteristic	Average	2-Year	5-Year	10-Year	25-Year
Wind Speed (km/hr)	10.40	38.70	44.40	45.70	46.40
Deepwater Significant Wave Height (m)	0.12	0.61	0.72	0.75	0.76
Peak Spectral Wave Period (s)	1.69	2.92	3.09	3.13	3.15
Wave Setup and Runup (m)	0.03	0.12	0.14	0.15	0.15
Depth of Sediment Motion (m)	0.55	3.70	--	--	--
Depth of Closure (m)			1.0		

To understand how wind-generated waves might affect the subtidal habitat, the commonly used procedure described in USACE (2006) was utilized. The procedure includes calculating the sediment shear stress generated by the wave conditions and comparing it to the critical shear stress required to move sediments of particular grain size. If the wave shear stress exceeds the critical shear stress, the waves have the potential to move sediment. It also allows engineers to determine the maximum depth at which waves have the potential to move sediment. The calculations include estimating the Shield's Parameter. It is important to highlight that the calculations are conservative and do not explicitly calculate if waves will move sediment, but simply indicate if waves have the potential to move sediment. The wave shear stress is calculated as:

$$\tau_w = \frac{1}{2} \rho f_w (u_o)^2; \quad (\text{Equation 1})$$

where  $\tau_w$  is the maximum bed shear stress,  $\rho$  is density of seawater ( $1,025 \text{ kg/m}^3$ ),  $f_w$  is an empirical wave friction factor, and  $u_o$  is the orbital wave velocity from linear wave theory. The critical shear stress required to move sand is calculated as:

$$\tau_c = \theta_c g D_{50} (\rho_s - \rho); \quad (\text{Equation 2})$$

where  $\theta_c$  is the critical Shield's parameter,  $\rho_s$  is the density of sediment (assumed to be a typical  $2100 \text{ kg/m}^3$ ), and median grain size ( $D_{50}$ ) is the median grain size. The critical Shield's Parameter ( $\theta_c$ ) is then given by:

$$\theta_c = \frac{0.30}{1+1.2D_*} + 0.055[1 - \exp(-0.02D_*)]; \quad (\text{Equation 3})$$

and

$$D_* = D_{50} \left[ \frac{\rho^2 g (s-1)}{\mu^2} \right]^{1/3}; \quad (\text{Equation 4})$$

where  $D_*$  is the non-dimensional grain size,  $s$  is the specific gravity of sand particles (2.05), and  $\mu$  is the dynamic viscosity of seawater ( $0.0012 \text{ N s/m}^2$ ).

Assuming a  $D_{50}$  for sand of 1mm based on surveys conducted by Hemmera (2015), it was determined that average waves ( $H_S = 0.12 \text{ m}$ ,  $T_P = 1.69 \text{ s}$ ) will only have the energy required to move sediments in depths shallower than 0.30 m (Table 6). The rock reef zone, most of the eelgrass zone, and most of the intertidal flats are generally below this depth at higher tide elevations, indicating that these sediments will not erode due to wave action under average wind and wave conditions; however, some erosion could occur during low tides. A

similar calculation with the 2-Year wind speed ( $H_s = 0.61$  m,  $T_p = 2.92$  s) shows that the deepest depth at which waves could potentially move sand is -2.7 m CD. The most shoreward parts of the intertidal flats and eelgrass zone can be within this range during low tides.

These calculations suggest that some erosion could occur during low tides, particularly with 2-Year wind speeds, but there are some additional aspects to consider. During low tides, much of Site is protected from wave action by shallow and exposed flats. These flats will break up wave energy so that the waves entering the Site will be significantly reduced in height. Furthermore, the 2-Year wind speed is not typically sustained for long periods of time, limiting the time that waves can erode sediments. Finally, these calculations assume a direct line of wave action along the fetch shown in **Figure 14**. In reality, waves will need to refract to hit much of the Northeast Basin and this will significantly reduce their height. Although it is possible that waves could erode portions of the subtidal habitat, it is unlikely based on limited exposure time (only during low tide conditions), protection during low tide conditions (flats, channels, and wave refraction), and limited duration. Based on these factors, it is unlikely that the 2-Year or more extreme wave conditions will generate significant erosion of the subtidal habitat. Depths of sediment motion are not shown in **Table 6** for longer return periods as this calculation is too conservative.

The depth of closure (DOC) was also calculated for the Site. The DOC is the maximum depth at which sediment motion is expected at a particular site with specific wave and sediment characteristics over the long-term. It is related to, but slightly different than, the previous calculations of shear stress and is commonly used in coastal engineering projects. An equation developed by Hallermeier (1981) was used and followed a procedure presented in USACE (2006). The DOC is calculated as:

$$DOC = 2.28H_e - 68.5 \left( \frac{H_e^2}{gT_p^2} \right); \quad (\text{Equation 5})$$

where  $H_e$  is the effective wave height and  $g$  is the acceleration due to gravity ( $9.81 \text{ m/s}^2$ ). The effective wave height is calculated as:

$$H_e = \overline{H_s} + 5.6\sigma_s; \quad (\text{Equation 14})$$

where  $\overline{H_s}$  is the annual mean significant wave height and  $\sigma_s$  is the standard deviation of the significant wave height. The USACE (2006) empirical equations were applied to the NOAA Vancouver Harbour wind data set to determine an average significant deepwater wave height of 0.12 m, a standard deviation of 0.1 m, a wave period 2.92 s. Applying these with the Hallermeier (1981) equation, the DOC was calculated as approximately 1.01 m. Most of the habitat zones are deeper than this depth during high tides but some of the shoreward portions of the habitat zones are within this depth during low tides. As described previously, the risk of erosion is most likely low as the Site is well protected during low tides.

The calculations suggest that wind-generated waves will most likely not erode the subtidal habitat features and that these will be stable over the long-term. It is important to note that this analysis does not include erosion of the backshore and uplands (i.e., areas above the HHWLT), which is not included in the current study. Further study may be required to determine erosive impacts in these areas.

### 2.5.3.2 Vessel Wake Conditions

Vessel wake (i.e., vessel-generated waves) has the potential to cause shoreline erosion. Empirical coastal engineering equations from USACE (2006) were used with typical vessel speeds and dimensions (length, beam, draft, etc.) to estimate potential vessel wake conditions at the Site. The results are shown in **Table 7**. The estimated wave heights are all relatively small (less than 1m) with short periods (less than 4 s). Wave setup and run-up heights at the shoreline were calculated using the Stockdon et al. (2006) empirical equation and the representative shoreline slope of 0.02 (NHC 2014). Although backshore and uplands design (i.e., areas above the HHWLT) is not included in the present study the setup and run-up heights are included for reference. They are all estimated to be small.

Table 7 - Estimated Vessel Wake Conditions at the Site

Wave Characteristic	Deep Sea Vessel	Cabin Cruiser	Coast Guard Cutter	Tugboat	Tugboat (High Speed)	Rescue Vessel
Boat Speed (knots)	14.0	9.9	9.9	9.9	13.6	9.9
Deepwater Significant Wave Height (m)	0.3	0.2	0.2	0.2	0.4	0.1
Wave Period (s)	3.8	2.7	2.7	2.7	3.7	2.7
Wave Setup and Runup (m)	0.1	0.1	0.1	0.1	0.1	0.1
Depth of Sediment Motion (m)	1.4	0.7	0.7	0.7	2.0	0.3

The approximate depth of sediment motion due to each vessel wake condition was estimated following the same procedure described in the previous section for wind-waves. The shear stresses generated by each vessel wake at shallow depths were compared to the critical shear stresses required to move sand. The deepest depths of sediment motion are shown in **Table 7**. Through consultation with the Tsleil-Waututh Nation, input was received regarding concerns about tugboat speed and vessel wake. Based on this input, this table includes a scenario of a tugboat traveling at high speed.

The maximum depth of potential sediment motion for the speeding tugboat scenario is -2.0 m CD. Generally, most of the habitat zones are deeper than this depth during higher tides. Shoreward portions of the intertidal flats and eelgrass zone are within this depth at low tides, indicating that some erosion could occur; however, there are several aspects to consider. The first is that the calculations are conservative and only calculate the depth at which waves can potentially begin to move sediment. As with wind-waves described in the previous scenarios, the shallow habitat bench will only be exposed to potential sediment motion during low tide conditions, which are limited in duration. Furthermore, tugboats only pass periodically and the wakes are limited in duration. Combining the limited low tide windows with the infrequency of passing boats suggests that the times that the shallowest habitats would be exposed to wakes are limited.

Finally, much of the Site is protected by surrounding flats during low tides, which will dissipate the waves. For these reasons, the risk of habitat erosion due to tugboat wakes is most likely low. It is important to note that this analysis does not include erosion of the backshore and uplands (i.e., areas above the HHWLT), which is not included in the current study as no habitat works are planned in the upland areas above the HHWLT.

## 2.6 Coastal Modelling

Numerical models were developed of the hydrodynamics and sediment transport at the Site. The modeling was conducted with the Danish Hydraulic Institute (DHI) MIKE 21 hydrodynamic model and modules (<https://www.mikepoweredbydhi.com/products/mike-21>) which are widely used in coastal engineering. The numerical modeling was used for three key aspects. The first was to understand the changes to tidal flushing from the dredging of the Southwest Channel and the addition of habitat areas in the Northeast Basin. The second was to understand the potential impacts of sedimentation from dredging activities and the placement of fill. The third was to determine if the intertidal and subtidal habitats will be stable and not erode over the long-term.

The pre-restoration model was setup and run with bathymetry data collected during the previous phase of the MMRP for the Site and adjacent areas. Publicly available bathymetry data for surrounding areas of Burrard Inlet from the Canadian Hydrographic Survey (<http://www.charts.gc.ca/data-gestion/500map-eng.asp/>) was added to the model. The model was run with the tide data described in Section 2.5.1 and the 2-Year easterly wind conditions from the NOAA Vancouver Harbour station shown in **Table 5**. The post-restoration model was run with the same input conditions except that the proposed designs of the Southwest Channel and habitat zones in the Northeast Basin were incorporated into the bathymetry. For sediment conditions, the survey information provided by Hemmera (2015) was utilized. The technical report notes "sand" as the dominant sediment within the

Southwest Channel area. As with the wave-driven sediment transport calculations, a median grain size ( $D_{50}$ ) of 1 mm was used, which is a common sand grain size and also noted in the sediment data used for numerical modelling of sediment dispersal associated with construction of the Centerm Expansion Project (Tetra Tech 2017).

#### 2.6.1 Model Domain

The model domain included much of Burrard Inlet (**Figure 16**). The western boundary of the model was aligned with Point Atkinson and the domain extended north up Indian Arm and west to the end of Burrard Inlet. The models were setup with a flexible mesh to allow for grid cells with different resolutions. A coarse mesh (500 m cell size) was used for much of the outer model domain, including outer Burrard Inlet and Indian Arm, to resolve the physics but save computation time. A finer mesh (100 m grid size) was used in areas immediately adjacent to the Site. A fine mesh (20 m grid size) was used in the Southwest Channel area, Main Basin, and Northeast Basin to provide results at high resolution.

Initial numerical model runs with the pre-restoration bathymetry were used to establish a baseline and understand the general circulation patterns and tidal currents in the area. Ebb and flood tidal currents are significant circulation features in this area. Previous numerical modeling studies have noted that tidal jets form as water is forced through the Second Narrows during ebb and flood tides (Tetra Tech 2017). **Figure 17** shows the current velocities during an ebb tide and **Figure 18** shows the current velocities during a flood tide.



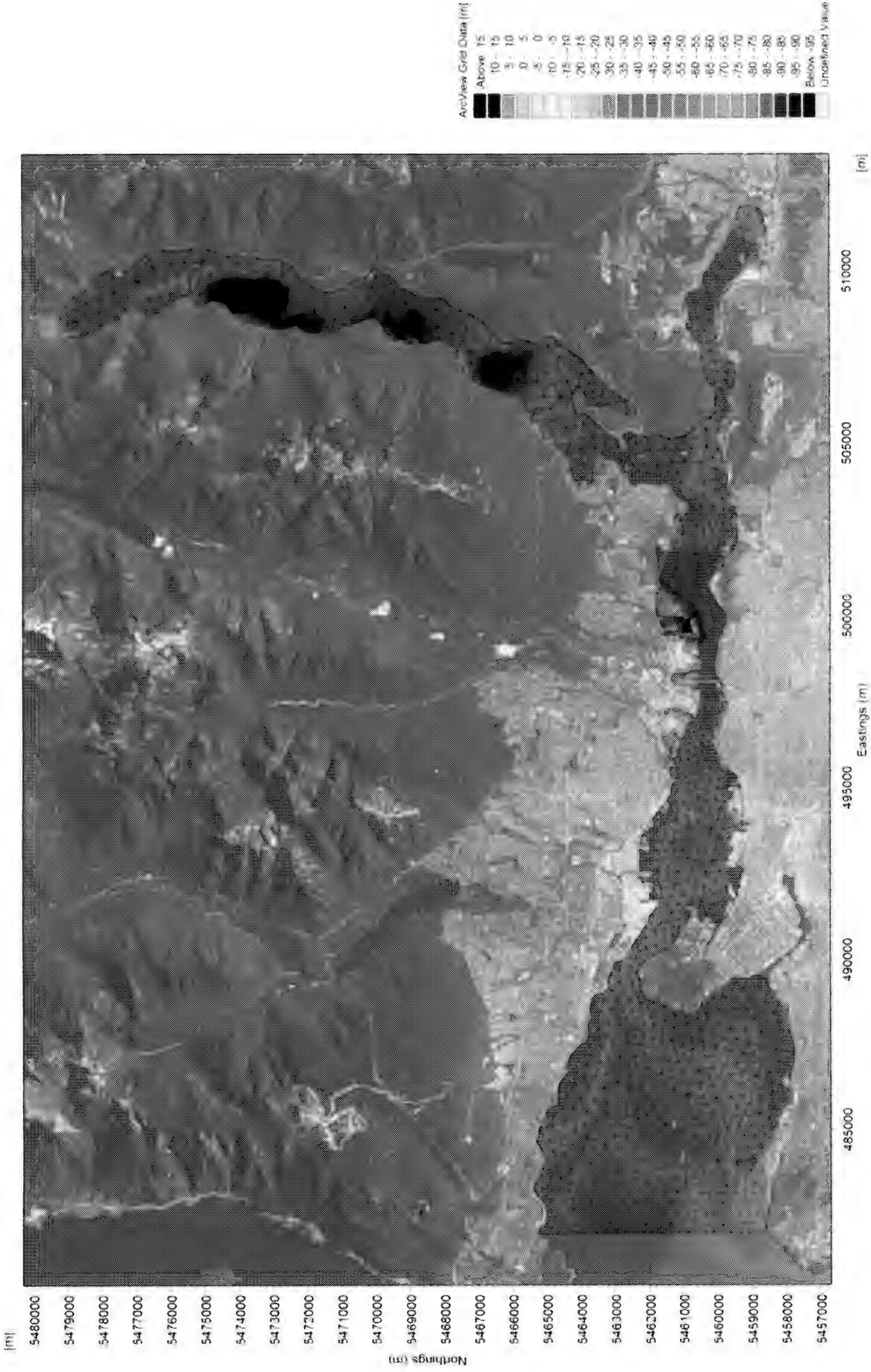


Figure 16 - The model domain of the DHI MIKE 21 numerical models



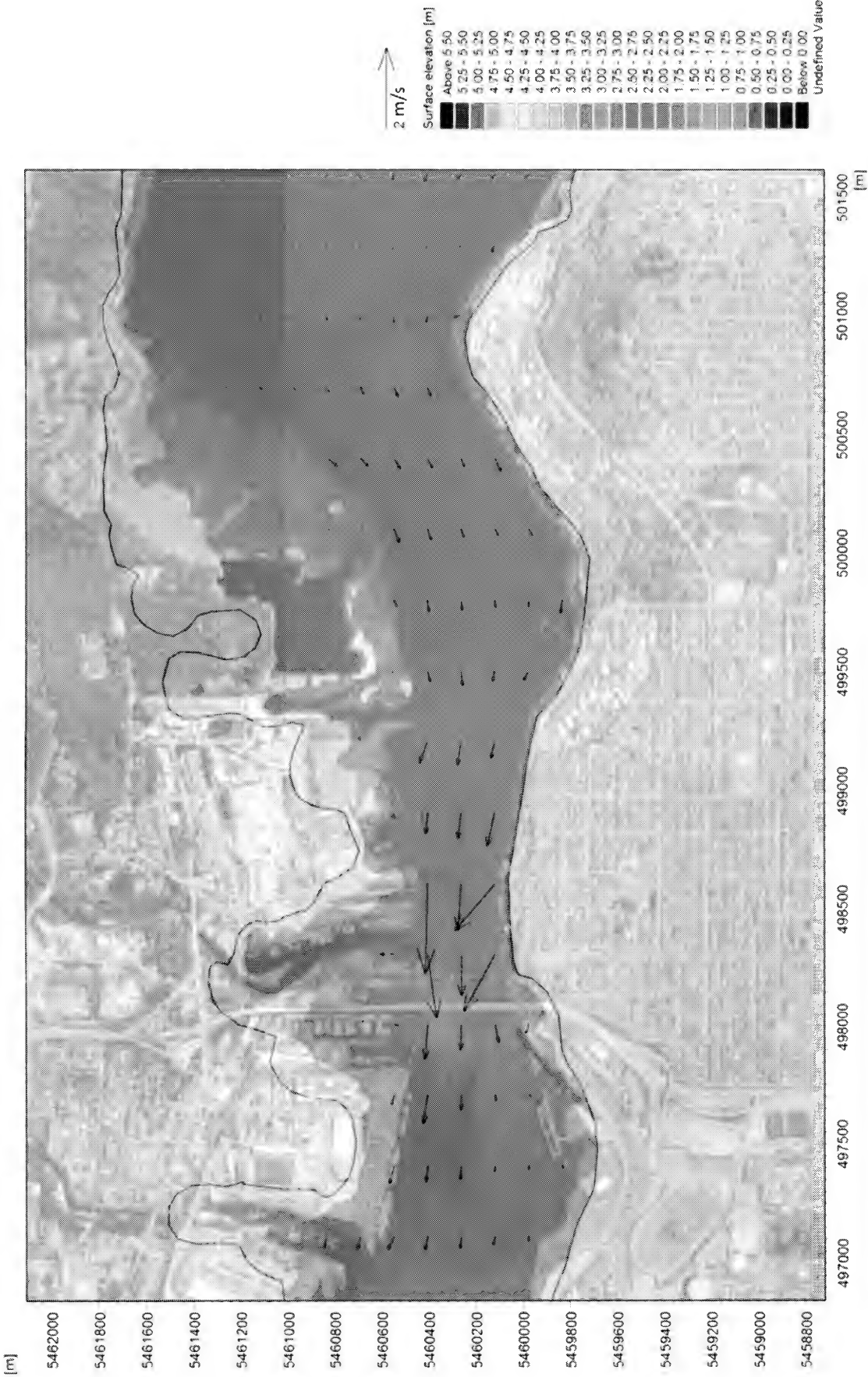


Figure 17 - Tidal currents and water surface elevations during an ebb tide

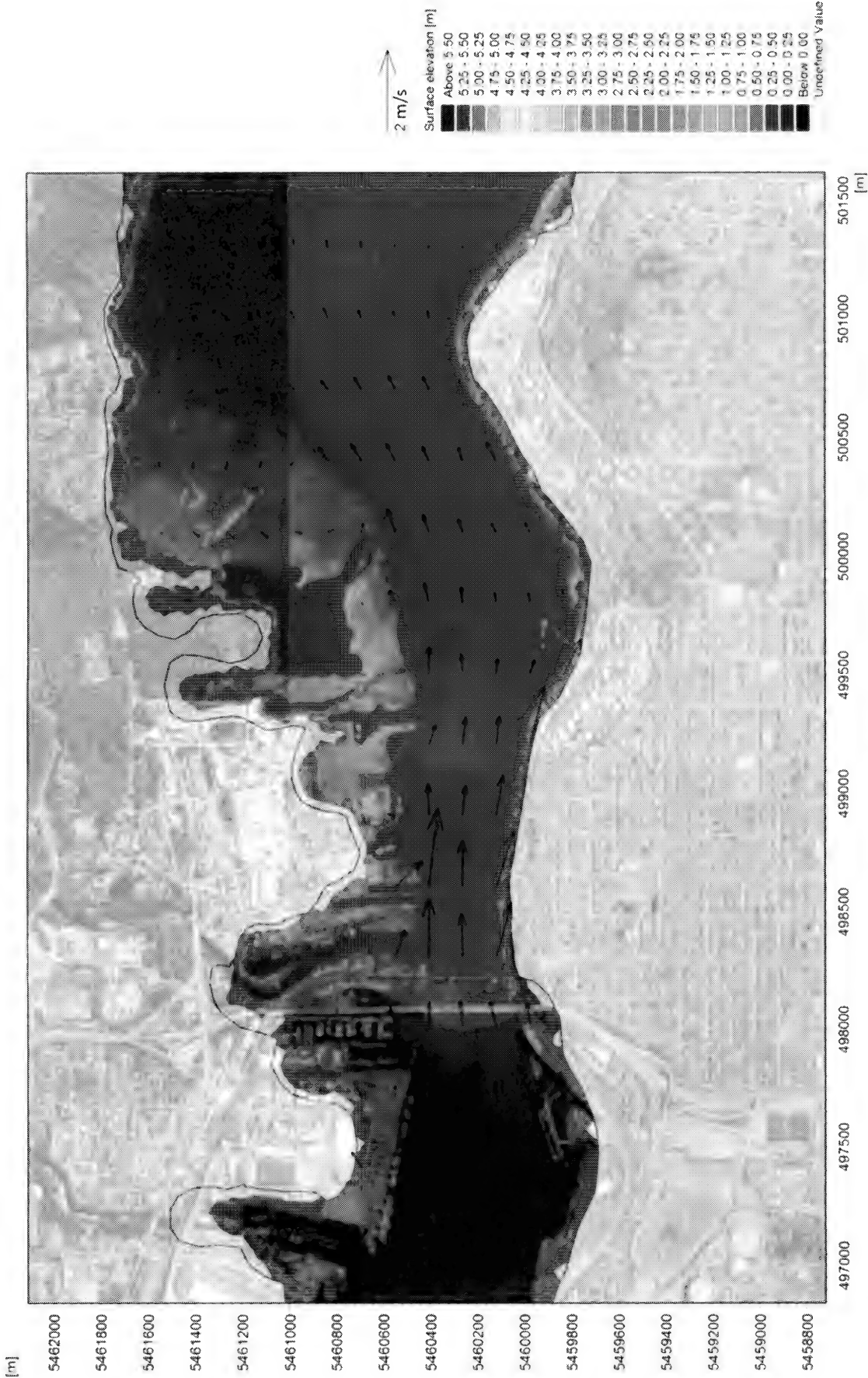


Figure 18 - Tidal currents and water surface elevations during a flood tide

Maximum predicted tidal current speeds near the Second Narrows during an ebb tide are approximately 2.0 m/s and the typical currents range from 1.0 – 1.5 m/s. Maximum predicted tidal current speeds near the Second Narrows during a flood tide are 2.5 m/s and the typical currents range from 1.5 – 2.0 m/s. Maximum current speeds at the Site are typically much lower. Maximum current speeds in the Northeast Basin range from 0.1 - 0.2 m/s. Maximum current speeds in the Main Basin range from 0.1 – 0.3 m/s. Maximum currents in the Southwest Channel area range from 0.1 – 0.9 m/s. At the proposed outlet of the channel, near the Second Narrows, there is an isolated area where the maximum predicted current speeds approach 1.4 m/s.

The model also predicts a large counter-clockwise eddy pattern immediately east of the Site. This is a significant circulation pattern which was noted by Tsleil-Waututh Nation (John Konovsky, November 17, 2017).

To determine wave conditions at the Site, the numerical model was also run with 2-Year easterly wind conditions from the NOAA Vancouver Harbour station shown in **Table 5** (38.7 km/h). The maximum significant wave heights ( $H_s$ ) from this wind condition are shown in **Figure 19** and are typically small throughout the Site. Maximum significant wave heights are approximately 0.2m in the Northeast Basin and parts of the Main Basin, and 0.1m in the west portion of the Main Basin and Southwest Channel. These wave conditions occur when the wind opposes the currents on a flood tide. Average significant wave heights are smaller at 0.1m throughout the Site (**Figure 20**). These modeled waves are smaller than the waves estimated using empirical equations (Section 2.5.3.1) most likely because the model includes dissipation due to the flats.





Figure 19 - Maximum significant wave heights from the 2-Year easterly winds (38.7 km/h)

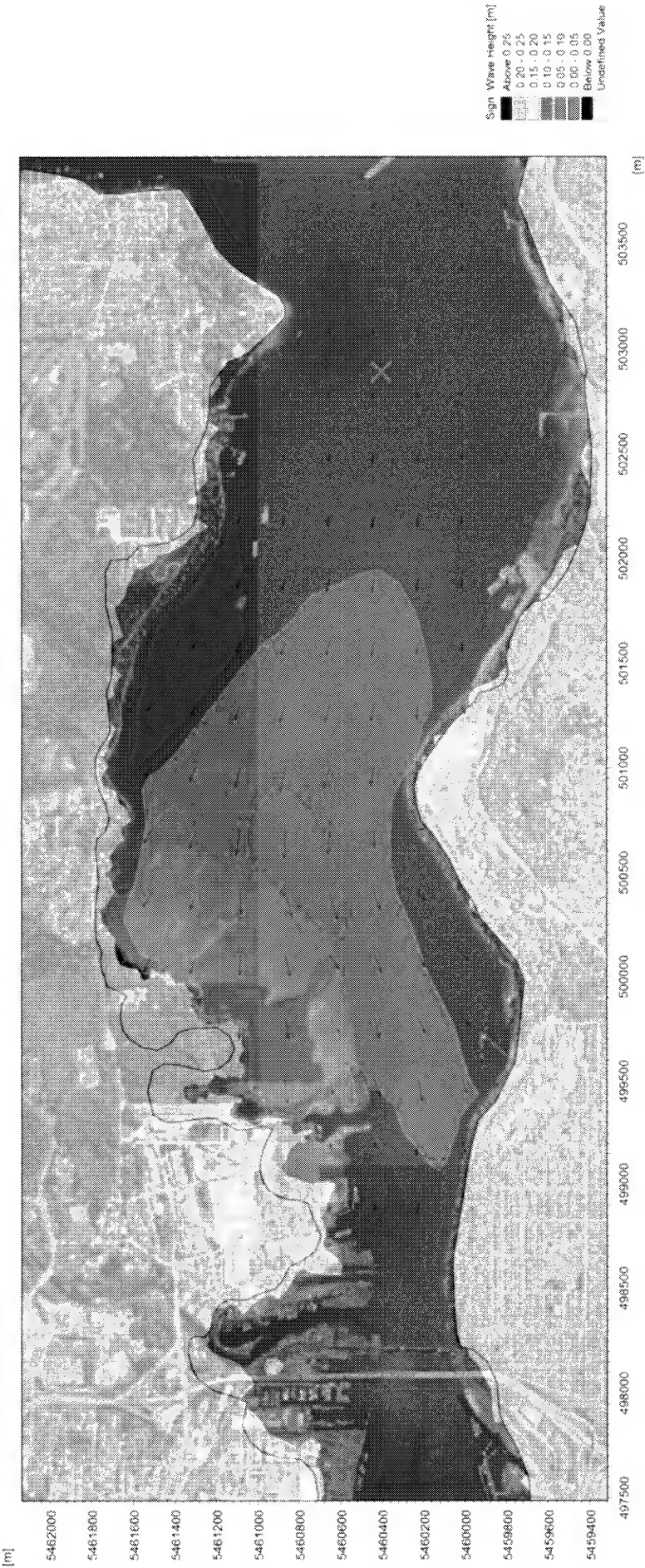


Figure 20 - Average significant wave heights from the 2-Year easterly winds (38.7 km/h)

### 2.6.2 Tidal Flushing

The hydrodynamic models were used to determine the potential alteration in residence time as a result of the proposed MMRP. This was done by modeling and calculating the residence time in several areas of the Site both pre- and post-restoration. The residence time is the approximate time a parcel of water spends in a specific area. It is typically used to estimate tidal flushing at a site. Pre- and post-restoration hydrodynamic models were run with a uniform dye tracer (**Figure 21**), initially released at the Site at 100 mg/L. Four model output stations were selected within the Main Basin and three within the Northeast Basin. The residence time was defined as the time taken for the concentration to drop by two-thirds (i.e., 33 mg/L).

**Figure 21** and **Figure 22** show snapshots of the uniform dye concentration after 7 hours for the existing and restored Site conditions respectively. A comparison of the figures demonstrates that after 7 hours, the dye is generally less concentrated under restored conditions. This is a qualitative comparison, but suggests that tidal flushing will generally improve after the creation of the Southwest Channel, and the infilling of the Northeast Basin.

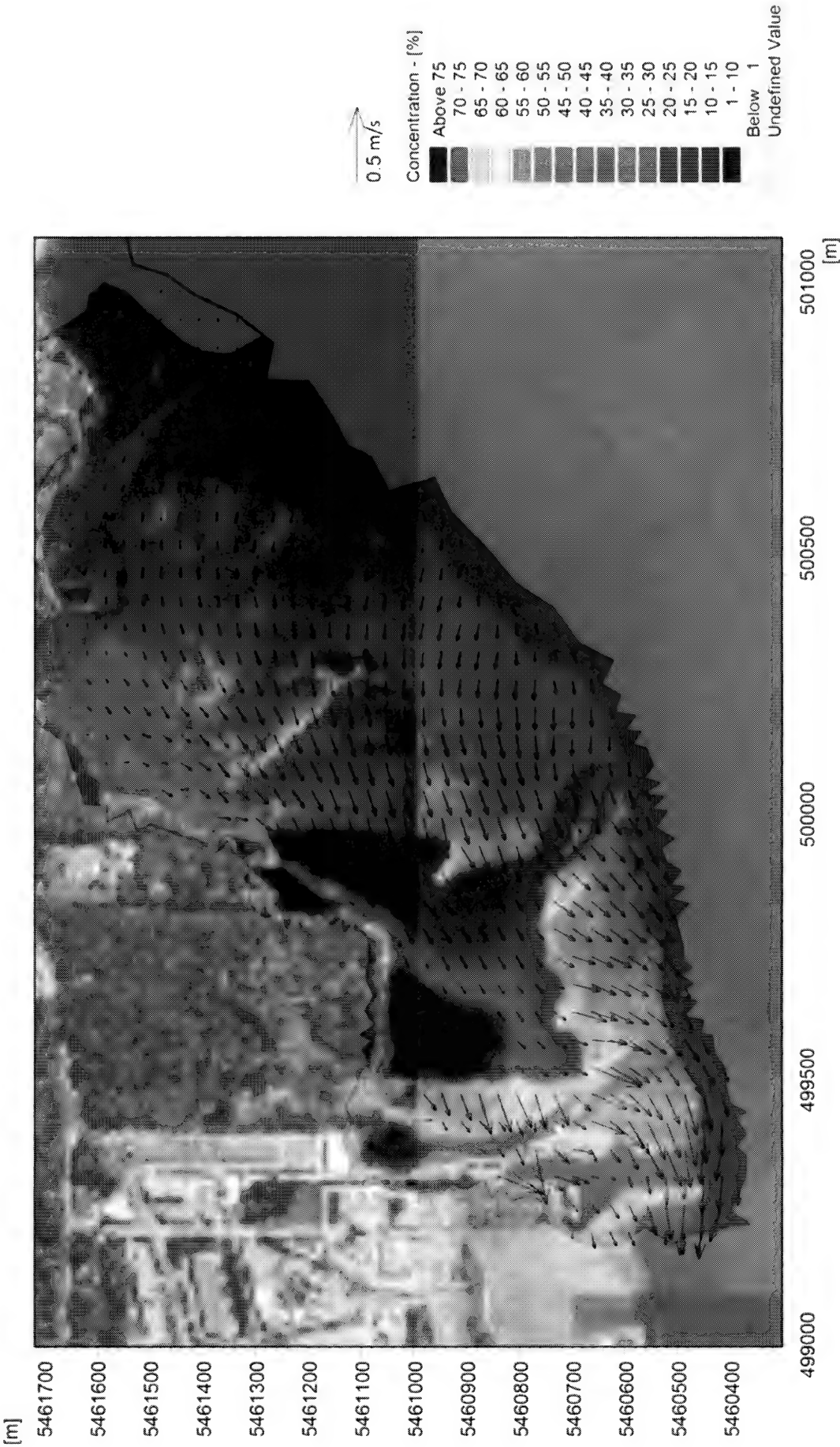


Figure 21 - A snapshot of the uniform dye tracer added to the existing (pre-restoration) hydrodynamic model after 7 hours



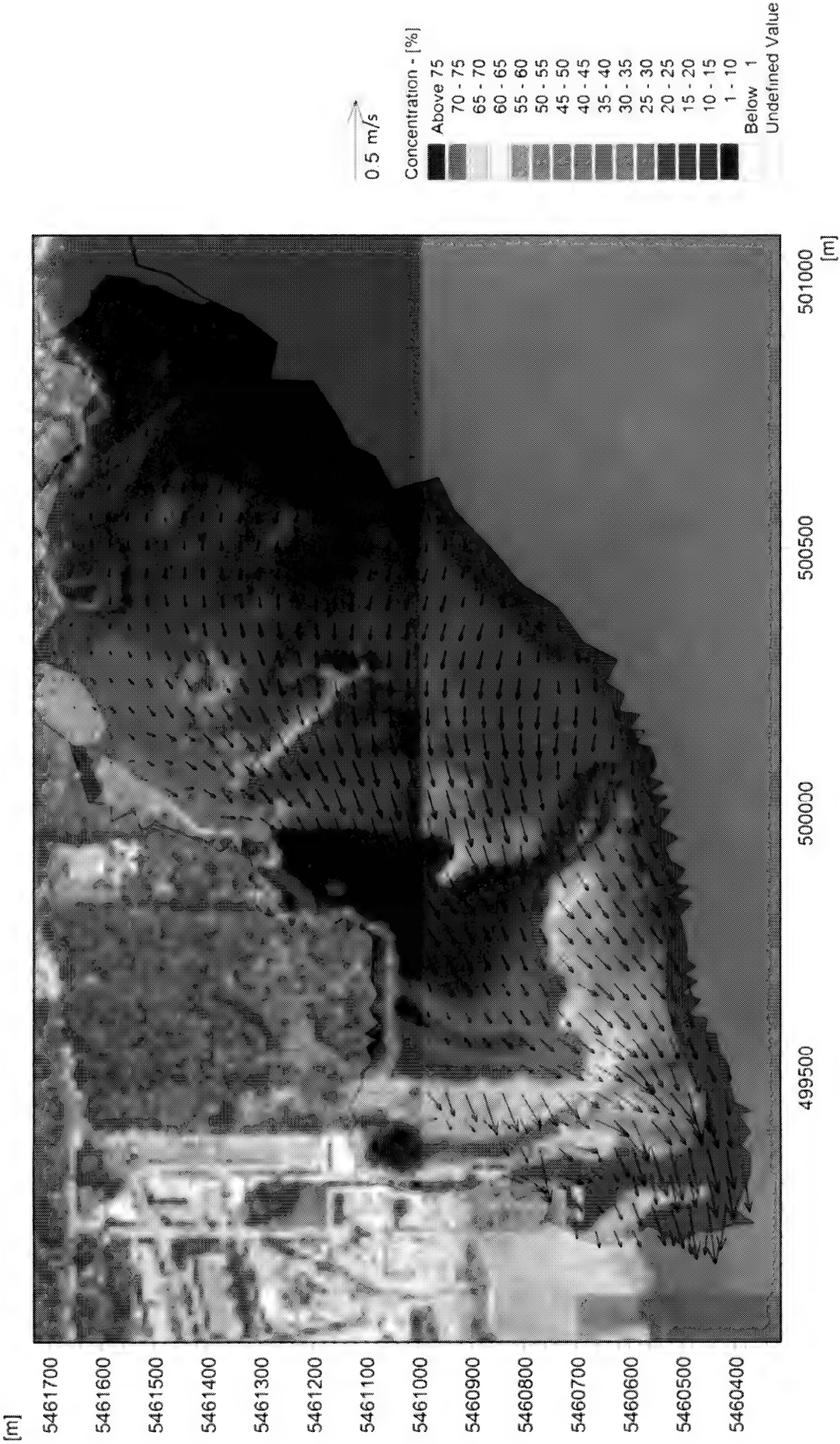


Figure 22 - A snapshot of the uniform dye tracer added to the restored (post-restoration) hydrodynamic model after 7 hours



Residence time was calculated at several model output stations within the Site for a quantitative comparison. The model output stations are shown in **Figure 23**. **Figure 24** shows an example of the dye-concentration over time at model output station Northeast Basin 1. The dye concentration generally decreases over time, but due to tidal currents there are some fluctuations. A best-fit exponential decay curve was fit to the data at each model output station. Each curve was used to predict the time it took for the dye concentration to decrease by two-thirds to 33 mg/L. The results for all model output stations are presented in **Table 8**. The residence times fluctuate slightly depending on where each model output station is within the Site. Some areas within the Site flush more quickly than others. In general, the residence times decrease for the restored conditions at all model output stations as shown in **Table 8**. The average residence time decreases from 7.4 hours to 3.1 hours. This indicates that the MMRP will improve tidal flushing throughout the Site by approximately 60%.



Figure 23 - Model output stations used to determine residence times.

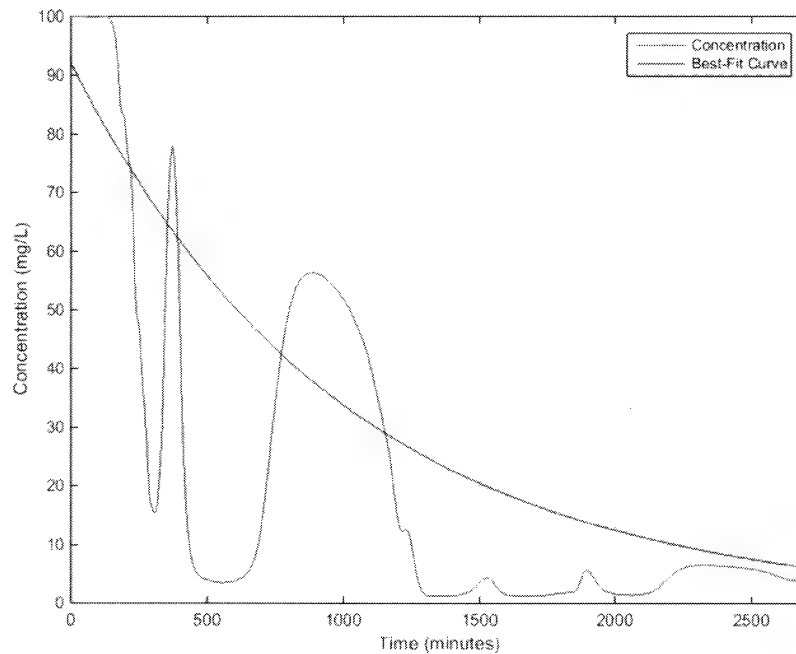


Figure 24 - Dye concentration (mg/L) over time at Model Output Station Northeast Basin 1

Table 8 - Residence Times for Existing and Restored Site Conditions

Model Output Station	Easting (m)	Northing (m)	Residence Time (Hours)	
			Existing	Restored
Main Basin 1	499600	5460900	9.7	4.2
Main Basin 2	499800	5460900	3.3	3.6
Main Basin 3	499700	5460900	11.0	3.1
Main Basin 4	499700	5460800	3.6	2.9
Northeast Basin 1	499900	5461200	17.1	3.1
Northeast Basin 2	499900	5461100	3.7	3.1
Northeast Basin 3	499900	5461000	3.7	1.5
<b>Average</b>			<b>7.4</b>	<b>3.1</b>

### 2.6.3 Sediment Transport

The numerical model for the existing conditions was run using the MIKE 21 sediment transport module which simulated dredging and fill placement conditions to determine the effects of these activities to the Site and surrounding area. It is anticipated that silt curtains will be used to minimize effects of suspended sediments on the surrounding area during dredging of the Southwest Channel and placement of fill in the Northeast Basin as the depths are shallow surrounding each area and the current velocities are low, making the Site ideal for use of silt curtains. The U.S. Department of Transportation (USDOT) Type III silt curtains are rated to withstand current velocities up to 1.5 m/s. The maximum modeled velocities at the Southwest Channel and Northeast Basin are below this velocity. Near the proposed outlet of the dredged channel, predicted maximum velocities approach 1.4 m/s in an isolated area for a limited time. Therefore, the silt curtains should be monitored in this area during active dredging. The silt curtains should eliminate any dispersion of dredged and placed sediments; however, sediment transport modeling was conducted without the curtains to determine potential effects if no curtains were used. The dredge characteristics used in the model are listed in **Table 9**. It was assumed that a clamshell dredge with a 26 m<sup>3</sup> bucket would be used to dredge the sediments from the Southwest Channel. This sediment would be

placed onto a flat-deck barge (or possibly bottom-dump barge) which, when full, would place the sediment at the Northeast Basin. The dredging was modeled as two point sources: one located in the Southwest Channel to represent the sediment that escapes the clamshell bucket as it is pulled up through the water column; and one located in the Northeast Basin to represent the sand that is released into the water column from the barge. The plan assumes dredging occurs on a 24 hrs/day basis for approximately 9-10 days, which is the estimated time to dredge the entire Southwest Channel.

Table 9 - Dredge Parameters Used in Sediment Transport Modelling

Dredge Parameter	Value	Units	Notes
Bucket volume	26	m <sup>3</sup>	Tetra Tech, 2017
Fill efficiency	0.6	-	Tetra Tech, 2017
Effective bucket volume	15.6	m <sup>3</sup>	
Volume of solids per bucket	7.57	m <sup>3</sup>	
Percent spillage	0.02	-	Tetra Tech, 2017
Volume of spillage	0.15	m <sup>3</sup>	
Volume of dumping	7.41	m <sup>3</sup>	
<b>Dredge Cycle</b>			
Grab Sediment from Southwest Channel	60	s	Tetra Tech, 2017
Dump sediment onto barge	90	s	Tetra Tech, 2017
Time of one dredge cycle	150	s	Tetra Tech, 2017
Relocate dredge	600	s	
Dump Sediment onto Northeast Basin	60	s	Tetra Tech, 2017
<b>Dredge Production</b>			
Volume of Southwest Channel to dredge	71,500	m <sup>3</sup>	MMRP interim volume used during early stages of 60% design development
Capacity of barge	1,500	m <sup>3</sup>	Tetra Tech, 2017
Number of cycles to fill barge	94	-	
Volume of solids on barge	697	m <sup>3</sup>	
Time to fill barge	14,100	s	
Time to fill barge	3.9	hours	
Number of dump trips to dredge Southwest Channel	48	-	
<b>Dredge Rates</b>			
Rate of spillage in Southwest Channel	0.0025	m <sup>3</sup> /s	
Rate of spillage in Southwest Channel	6.91	kg/s	
Source flow rate	0.01	m <sup>3</sup> /s	Defined by MIKE model
Concentration of sand	691	kg/m <sup>3</sup>	
Rate of dumping in Northeast Basin	11.6163	m <sup>3</sup> /s	
Rate of dumping in Northeast Basin	31,829	kg/s	
Source flow rate	0.01	m <sup>3</sup> /s	Defined by MIKE model
Concentration of sand	3,182,875	kg/m <sup>3</sup>	
<b>Cycle Dredge Rates</b>			
Rate of spillage in Southwest Channel	0.0025	m <sup>3</sup> /s	
Rate of spillage in Southwest Channel	6.91	kg/s	
Source flow rate	0.01	m <sup>3</sup> /s	Defined by MIKE model
Concentration of sand	691	kg/m <sup>3</sup>	for 1 minute of dredging
Rate of dumping in Northeast Basin	0.1236	m <sup>3</sup> /s	
Rate of dumping in Northeast Basin	338.60	kg/s	
Source flow rate	0.01	m <sup>3</sup> /s	Defined by MIKE model
Concentration of sand	33,860	kg/m <sup>3</sup>	for 1 minute of dumping

**Table 9** uses estimated volumes developed during the preparation of the 60% Design. As the geometric design progresses, there are expected variations between the volumes used in this modelling assessment, and those used to compile the estimated quantities shown in Section 3.6. It is considered that these variations do not change the outcomes of the sediment modelling. Furthermore, the placement of imported fill material in the Northeast Basin is expected to result in similar sediment deposition as the placement of the dredged material from the Southwest Channel.

**Figure 25** shows a snapshot of the plume of maximum concentration of total suspended solids (TSS) during dredging of the Southwest Channel. The plume is very limited in area, generally restricted to the channel area, and dissipates quickly. This is most likely due to the dredged material, sand, which has a relatively high settling velocity (0.1 m/s). In addition, the currents are relatively slow and the area shallow such that much of the sand settles out before it has any time to disperse. Maximum concentrations at the center of the plume are approximately  $2.3 \text{ kg/m}^3$  (2,300 mg/L). This generally dissipates to below  $0.05 \text{ kg/m}^3$  (5 mg/L) within 20 m and  $0 \text{ kg/m}^3$  (0 mg/L) within 30m. A time series of TSS dispersion in the Southwest Channel is shown in **Figure 26**. The TSS concentrations peak as the clamshell bucket is pulled up through the water column at  $1.2 - 2.3 \text{ kg/m}^3$  (1200 – 2,300 mg/L) and rapidly fall below  $0.05 \text{ kg/m}^3$  (5 mg/L).

**Figure 27** shows a snapshot of the maximum plume of TSS concentrations during placement of fill in the Northeast Basin from a hopper dredge. The plume is also limited in area: generally restricted to the basin area, and dissipates quickly. As with the Southwest Channel, this is most likely due to the relatively high settling velocity of the sand, the relatively slow currents, and the shallow depths surrounding the Northeast Basin which combine such that the sand settles out before it has any time to disperse. Maximum concentrations at the center of the plume are high at approximately  $80 \text{ kg/m}^3$  (80,000 mg/L). This generally dissipates to below  $0.05 \text{ kg/m}^3$  (5 mg/L) within 20 m and  $0 \text{ kg/m}^3$  (0 mg/L) within 30 m. A time series of the TSS at the Northeast Basin is shown below in **Figure 28**. The TSS concentrations peak as the hopper barge releases sediment into the water column at greater than  $90 \text{ kg/m}^3$  (90,000 mg/L) and rapidly fall below  $0.05 \text{ kg/m}^3$  (5 mg/L) as the sand settles out.

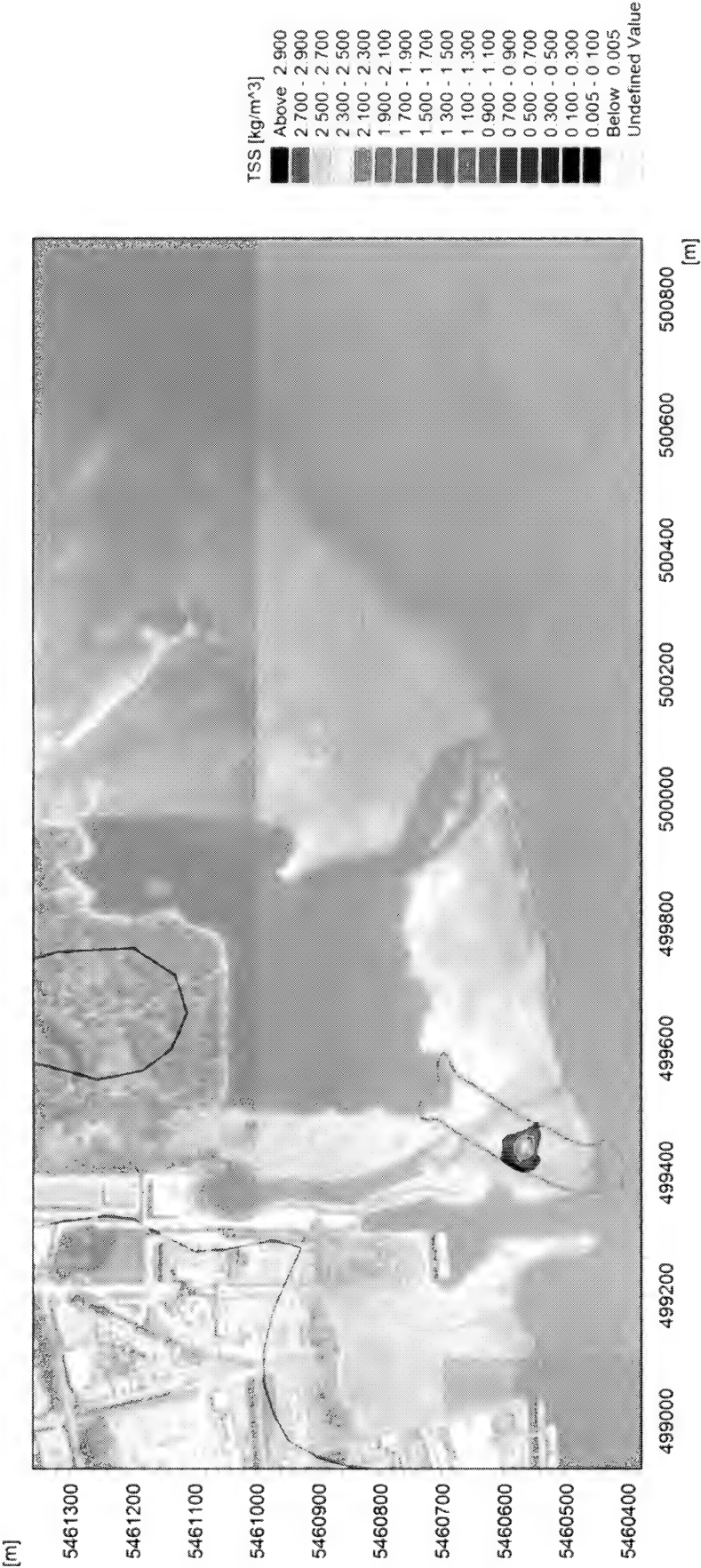


Figure 25 - The plume of maximum TSS concentration from the clam shell dredging the Southwest Channel

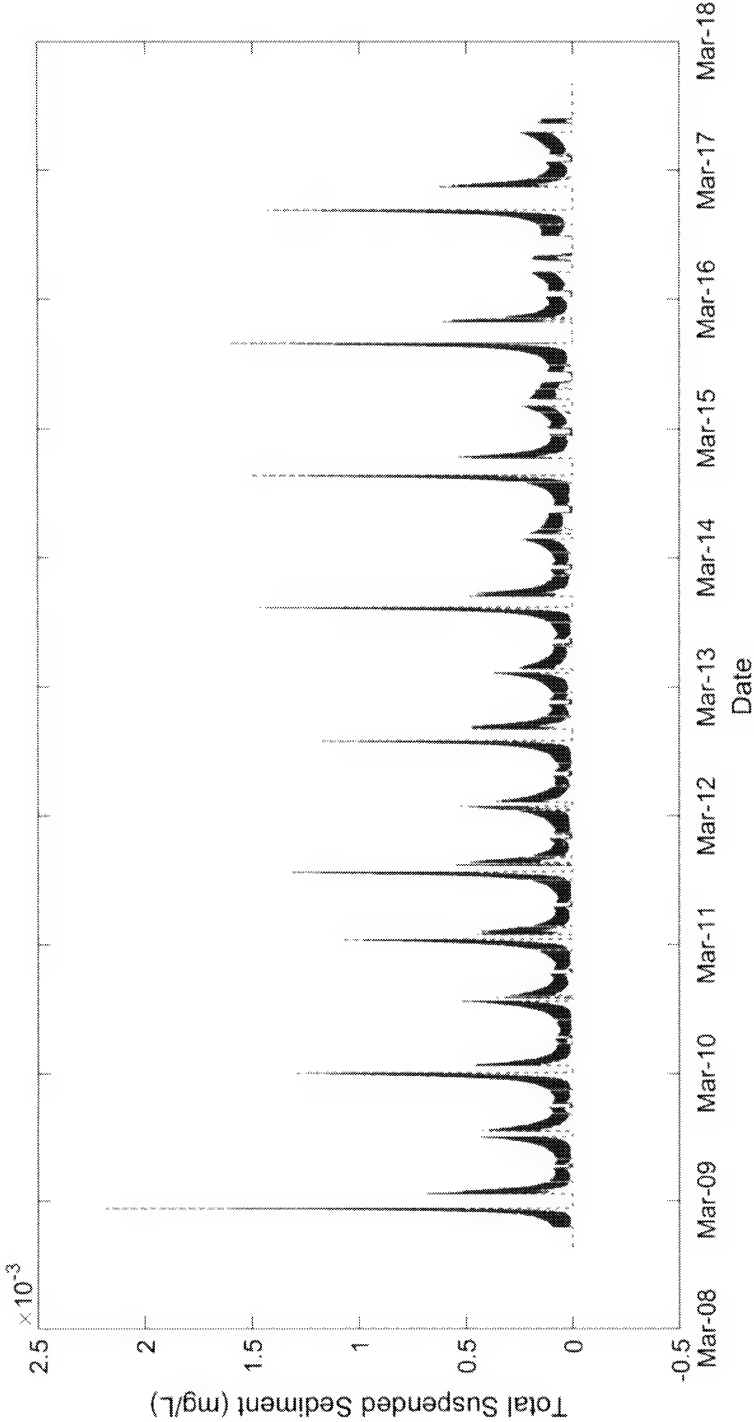


Figure 26 - A time series of TSS concentration at the Southwest Channel site due to clamshell dredge operation



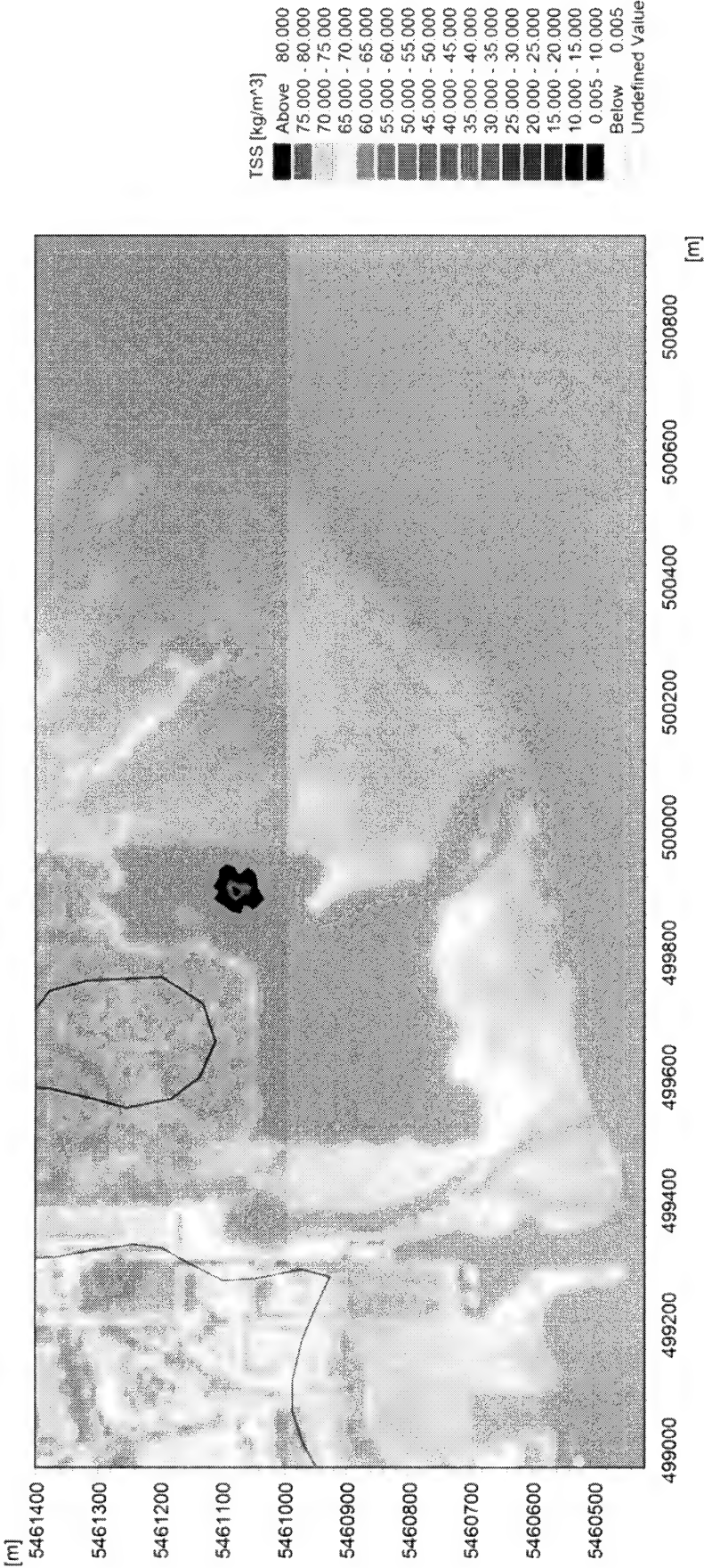


Figure 27 - The plume of maximum TSS concentration from the hopper barge release of sediment in the Northeast Basin

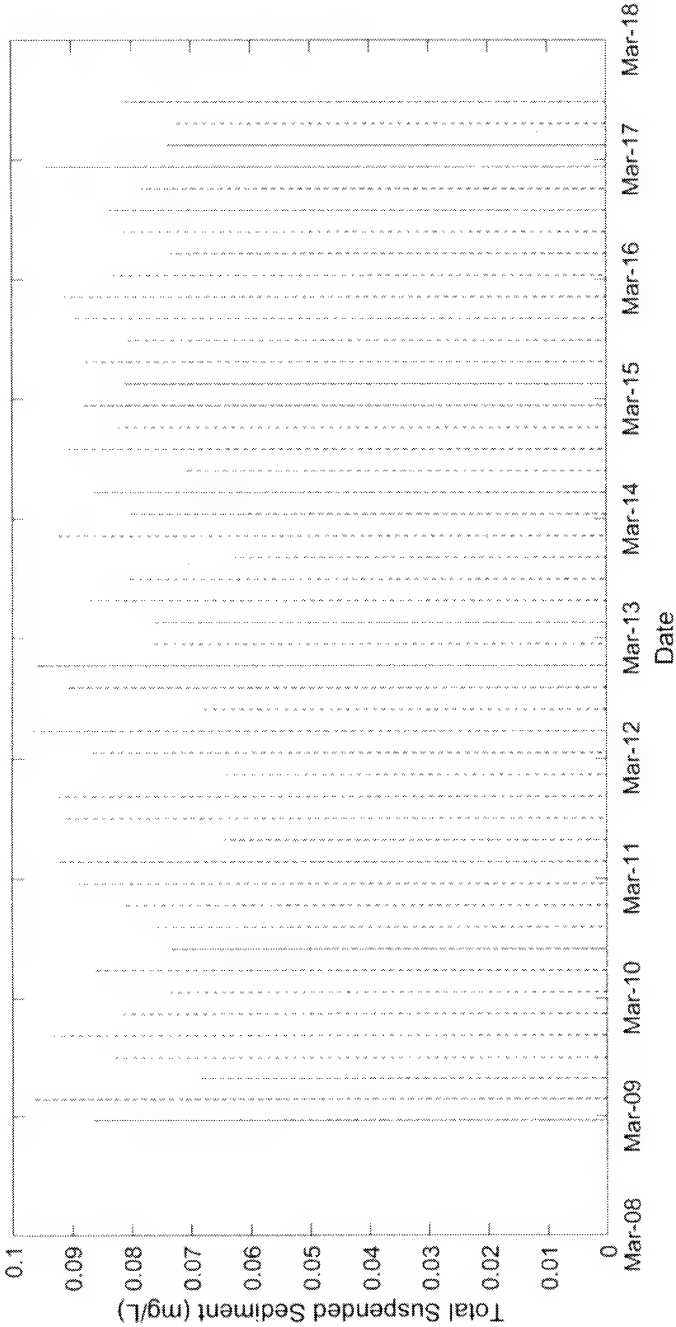


Figure 28 - A time series of TSS concentration at the Northeast Basin due to hopper barge operation



The sediment transport modeling indicates that the TSS concentration plumes and sediment deposition will be limited and restricted to the dredging and infilling areas. This is likely due to the high settling velocity of sand, the relatively slow currents, and shallow bathymetry at the Site, which combine such that any released sand settles out quickly. The modeling suggests that impacts to the surrounding area due to dredging and fill placement are expected to be minimal. There is some uncertainty in the modeling and as described previously, it is still recommended that USDOT Type III silt curtains are used to reduce the risk of any sedimentation effects. The Site is well-suited to the use of silt curtains; therefore, their effectiveness is expected to be high.

The post-restoration model with the sediment transport module was run to determine if there would be any erosion effects to the subtidal habitat placed in the Northeast Basin. Although previous sediment transport calculations indicated that waves will most likely not erode the habitat zones, the modelling included waves. The model was run for a one week period due to computation limitations of incorporating the wave and sediment transport module. **Figure 29** shows the change in bed thickness at the end of the model simulation. The results generally suggest no significant erosion to the habitat zones in the Northeast Basin, indicating that the proposed habitat will be stable. Further refinement of the sediment transportation modelling is anticipated in the next phase of design development.

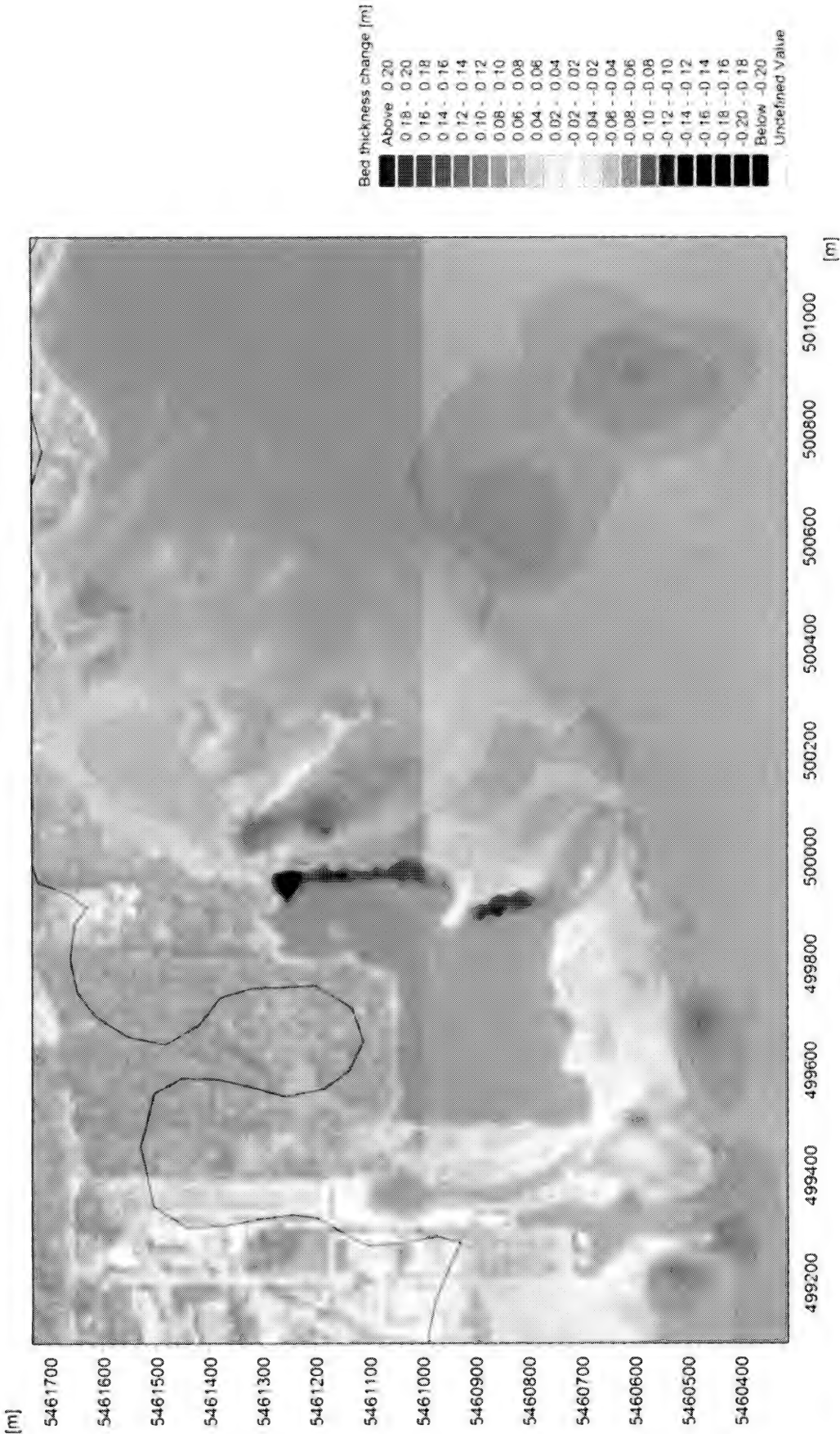


Figure 29 - Change in bed thickness due to sediment erosion and deposition patterns at the Site.

## 2.7 Geotechnical Considerations

Preliminary geotechnical considerations are presented in a technical memorandum contained in **Appendix A**. This memorandum provides preliminary geotechnical considerations and is based on a review of available geology maps, geotechnical reports prepared by others, limited Site reconnaissance, geotechnical information collected from the 2018 geotechnical exploration program and the 60% design for the proposed marine restoration works.

Based on the ground conditions observed in the 2018 geotechnical exploration program, the predominant native material in the proposed habitat and channel areas is sand and gravel with cobbles. In the Northeast Basin and Main Basin areas the granular materials are overlain by recent deposits of soft silt sediment that have accumulated since the area was dredged for gravel extraction and marine operations. Inferred soft sediments were up to 1.5 m thick in the Main Basin and 2.0 m thick in the Northeast Basin. The native sand and gravel with cobbles stratum extends to relatively great depth, well beyond the proposed channel depth. Various types of fill materials have been placed in the upland areas to raise the site grades above tidal level; however, no geotechnical explorations were conducted in the upland areas. The existing fill side slopes are nominally 4H:1V in the Northeast Basin area and the seabed has slope ratios of 10H:1V or flatter according to the bathymetric survey information.

The native sand and gravel with cobbles currently present within the proposed Southwest Channel area is deemed dredgeable with appropriate equipment. The main geotechnical challenge for the proposed Northeast Basin habitat area development is the low shear strength of the newly deposited soft sediment, which will require staged placement in shallow layers to preclude bearing capacity failure and slope instability during fill placement. These soft sediments will also be subject to long-term consolidation settlement during and following fill placement. Settlement is discussed further in Section 3.4.

The technical memorandum included in **Appendix A** describes geotechnical conditions; suitable gradations for fill materials; and slope stability, settlement, and other geotechnical considerations for the proposed MMRP.

The MMRP is a marine infilling and habitat creation project which does not include any marine structures that would require the consideration of seismic events in their design. As such, no seismic design requirements for the MMRP have been established.

### 3. Project Design and Construction Details

The proposed MMRP would comprise the creation of intertidal habitat within the Northeast Basin of the Site. The Northeast Basin habitat would be created by infilling the Northeast Basin to form an intertidal zone, and a deeper reef zone, separated by a rock dyke to contain the fills needed to establish the intertidal/subtidal habitat.

The Southwest Channel will be established to provide long-term access to the Main Basin and adjacent Northeast Basin during construction while also enhancing tidal flushing in the Maplewood Basin. The side slopes of Southwest Channel will be lined with rock revetment to protect against scour while also providing rock reef habitat. The bed of the Southwest Channel, which is approximately 40 m wide, will also have approximately 20 m of its width lined with rock to create rock reef habitat, with the remaining 20 m width, the channel floor, staying uncovered and providing edge habitat as discussed in Section 2.4.

Details of the proposed MMRP design are discussed in the sections below, with detailed drawings, to a 60% design level, included in **Appendix B**.

#### 3.1 Habitat

The 60% design plan proposes enhancements to deep subtidal habitat in the Northeast Basin of the Site through the creation of three habitat types. Habitat gain is also expected to be generated as part of the channel development southwest of the Main Basin. The three habitat types currently proposed as enhancement include:

- **Intertidal flat habitat** to support bivalve shellfish and other infauna,
- **Shallow subtidal eelgrass** habitat to provide nursery habitat for CRA fishery species (e.g., Dungeness crab and Pacific salmon). Intertidal flat and subtidal eelgrass habitat will be created through raising the elevation of an existing subtidal area in the Northeast Basin; and,
- **Rocky reef habitat** to support broad-bladed kelp and encrusting or colonial invertebrates, providing habitat and food for a variety of CRA fishery species (e.g., lingcod) in the Northeast Basin at the toe of the eelgrass bed and in the Southwest Channel at the southwest of the Site.

It is anticipated that eelgrass habitat and rocky reef-macroalgal habitat will increase the availability of refugia, primary productivity, and detrital production at the Site. These changes have the potential to benefit a variety of life stages of a range of marine fish that contribute to a CRA fishery including rearing juvenile salmonids, bivalves, juvenile Pacific Herring, rockfish, lingcod, and Dungeness crab. The habitat types proposed will result in the creation of highly productive habitat in the vicinity of CEP, aligning with DFO's offsetting goal of maintaining or improving the productivity of the CRA fishery.

##### 3.1.1 Intertidal Flat and Eelgrass Habitat Design

As noted, intertidal flat and subtidal eelgrass habitat will be created by raising the elevation of the existing subtidal areas in the Northeast Basin (**Figure 7**, and **Appendix B**). Fill material for this intertidal/subtidal habitat will consist of dredged material from the creation of the Southwest Channel, topped with a layer of imported Fraser River sand 2.0 m to 6.0 m thick. Sediment for previous successful transplanted eelgrass beds on Roberts Bank was dredged from the Fraser River—the same material proposed for the surficial layers of the MMRP eelgrass bed (C. Durance 2017, Precision Identification, pers. comm.). The imported Fraser River sand will also provide the conditions suitable for colonization by infaunal and epifaunal invertebrates.

This intertidal/subtidal habitat will be constructed at an elevation range between +2.0 m and -2.0 m CD, with eelgrass habitat created in the subtidal zone. At the toe of the intertidal/subtidal habitat, a rock dyke structure comprising approximately 1,800 m<sup>3</sup> of rock material will be placed as a containment dyke from approximately -2.0 m to -4.0 m CD to contain the fill materials. Although eelgrass bed elevation and substrate composition can vary significantly depending on local conditions, eelgrass in the South Coast region usually grows best at elevations between +0.5 m and -2.0 m CD and in sandy silt or silty sand (C. Durance 2017, Precision Identification, pers. comm.). The MMRP eelgrass bed design reflects this criterion. The intertidal/subtidal gently sloping habitat will also enable adaptive shoreward migration of eelgrass habitat in response to future sea level rise.

A variety of methods to accelerate MMRP habitat colonization and functionality are being considered in discussion with Tsleil-Waututh Nation, and will be refined as the MMRP design progresses. These methods may include applying shell hash to the surface of the created intertidal flat to speed up natural bivalve recruitment. Placement of shell hash provides hard substrate of high complexity and abundant microhabitat, factors expected to result in a higher and faster rate of settlement of pelagic life stages of bivalves than that of mud or sand substrate. In addition, shell hash application could increase the localized availability of minerals used in mollusc shell development (e.g., aragonite).

### 3.1.2 Rock Reef Habitat (Northeast Basin)

At the toe of the rock dyke structure, additional rock will be added seaward to create additional rock reef habitat (**Figure 7**, and **Appendix B**). The reef habitat elevations fall within the Burrard Inlet photic zone<sup>2</sup>, thereby enabling photosynthesis and growth of algae and other marine vegetation.

At the toe of the dyke, approximately 6,000 m<sup>3</sup> of material would be placed to form rock reef habitat extending southward. In combination with the face of the dyke, this material will result in approximately 1.0 ha of rock reef habitat complex (i.e., including edge habitat) being created in the Northeast Basin. The reef structure would be an average of 1m high, with surface elevations ranging between 0.5m and 1.5 m formed using a variety of rock sizes. It is expected that a number of rock reef structures will be placed in the Northeast Basin, up to 10 m apart to create internal channels to provide edge habitat. Rock sizes would be nominally 300 mm to 900 mm, with a  $D_{50}$  of ~600 mm; material gradation providing larger boulders up to 1,200mm diameter will be included to facilitate the surface variability.

The placement of rock to form the reef structures may require an initial layer of smaller sized bedding rock onto which the larger rock material forming the reef structure is placed. This initial layer would be part of the overall volume of the reef structure.

An archaeological site is located on the intertidal flats near the southeast corner of the Northeast Basin. This archaeological site is associated with a work avoidance zone (WAZ) approximately 50m in diameter. The WAZ restricts the southeastern extent of the rock reef habitat in the Northeast Basin.

### 3.1.3 Rock Reef Habitat (Southwest Channel)

In the Southwest Channel, approximately 7,800 m<sup>3</sup> of rock material will be placed along the sides of the Southwest Channel as revetment to protect the side slopes and to provide rock reef habitat. This revetment, an average of 700mm thick, will be placed at depths ranging from +2.0 m to -4.0 m CD and will comprise rock of various sizes; nominally 350 mm to 750 mm, with  $D_{50}$  of ~500 mm.

Approximately 6,000 m<sup>3</sup> of material will be placed at the base of the channel, to create additional rock reef structures. These structures would be similar to the rock reef structures proposed in the Northeast Basin, including anticipated material gradation and upper rock sizes, and a reef height averaging 1m high, with surface elevations ranging between 0.5m and 1.5 m formed using a variety of rock sizes. An approximately 20 m wide section of the channel floor not proposed to be covered by rock reef structures is of a suitable width to allow for the provision of edge habitat. In combination, the placement of rock reef habitat in the Southwest Channel, coupled with the edge habitat, will cover approximately 2.4 ha.

## 3.2 Slope and Scour Protection

### 3.2.1 Southwest Channel

Import and placement of quarried rock for slope protection and establishment of reef structures along the side slopes and in the channel within the Southwest Channel will commence once sufficient length of the Southwest Channel has been dredged and surveyed for acceptance. This will be when enough length of the Southwest Channel has been dredged to allow freedom of navigation and operation for two marine derricks to work simultaneously within the channel. This rock placement work would be carried out by a clam-shell derrick (using

<sup>2</sup> The photic zone within the Burrard Inlet is approximately 12 m deep (Wallen and Geen 1971)

computer-aided control and visualization in the cabin throughout) with rock supplied to site on flat-deck or bottom-dump scows. Partially loaded scows may be required to allow safe passage over the Southern Intertidal Area; at least until the Southwest Channel dredging is completed. The profile of the slope protection, bedding and rock layers would be surveyed for conformance with design when complete.

#### 3.2.1.1 Southwest Channel Revetment Sizing

As noted in Section 2.5, the effect of waves on the Site slopes is very small compared with the effect of the tide and current velocity drag. The rock size required for the Southwest Channel slope protection revetment has been calculated using the relevant methods provided in the "United States Army Corps of Engineers - Engineering Manual EM 1110-2-1601" and "US Army Corps of Engineers - Shore Protection Manual, Volume II" using the maximum velocities from the post-restoration coastal model. This analysis results in an estimated  $D_{50}$  rock size of 100 mm diameter for slope revetment to resist wave action, which is substantially smaller than the optimum size required to support the habitat provision (per section 3.1.3). Therefore, the recommended rock size for the Southwest Channel slope revetment has been designed to support habitat creation, with a  $D_{50}$  size of 500 mm diameter.

#### 3.2.2 Northeast Basin Barge Channel Apron

Within the Northeast Basin, the existing barge channel provides an outlet for the watercourse to the north. To protect the intertidal flats from scour at the outlet of the barge channel, a scour protection apron of rip rap (estimated to be BCMOTI Class 100 equivalent) is included, covering approximately 300 m<sup>2</sup> of the intertidal flats at the mouth of the barge channel.

### 3.3 Marine Works

The MMRP will include marine dredging and associated slope protection, a rock dyke, rock reefs, and reclamation fills (of re-used dredged material and imported sand) to form the intertidal flats and eelgrass bed. Each aspect of the marine work is described in more detail in the following sections. Construction methodologies discussed in this section represent anticipated methods that may be employed in the construction of the MMRP, and may not represent the construction means and methods employed by the eventual contractor engaged to undertake the work.

#### 3.3.1 Channel Dredging and Reclamation Filling

The Southwest Channel will be developed by dredging the marine sediments down to design grade, shaping the side slopes to accept slope protection. The Southwest Channel could either be dredged using a marine derrick equipped with a clam-shell bucket, or by using a cutter-suction dredge (hopper type or direct discharge type). Site constraints (operational space, and intertidal flat elevations relative to tidal levels), and the availability of suitable marine dredging equipment in the local market, would indicate that clam-shell dredging is likely to be the most cost-effective method to construct the Southwest Channel to the required tolerances. The practical dredging tolerance is anticipated to be  $\pm 0.15$  m, which will be suitable to achieve the required channel profile and to allow for reasonably uniform placement and thickness of slope protection bedding and armour rock.

The contractor will likely choose to dredge starting at the inner end of the Southwest Channel, working in a southwestern direction towards the main channel of Burrard Inlet, because this will facilitate loading of dredged material onto scows for placement at the Northeast Basin without requiring the loaded scows to be towed over the Southern Intertidal Area (note: there is limited available draft over the Southern Intertidal Area except on higher tides). However, this method still requires the contractor to move marine equipment (derrick, empty scows, tugboat, workboat) over the Southern Intertidal Area during a high tide, before the start of dredging, and at completion of dredging. This "work direction" will also provide better protection of the cut side slopes of the Southwest Channel from incident waves (and swell from vessels passing through the Second Narrows reach), in temporary exposed conditions prior to placing bedding and armour rock for slope protection.

The contractor may elect instead to dredge the Southwest Channel in horizontal cuts to full channel length, to provide better control of the overall cut shape and to allow partially-loaded scows to transit the channel at the



earliest opportunity. Once the Southwest Channel is fully dredged to design grade (EL -4.0 m CD), it will be deep enough to allow transit of fully-loaded scows.

The method of conveyance for the dredged material, from the Southwest Channel dredging area to the fill location at the Northeast Basin, will depend on the equipment used by the contractor, on any environmental controls implemented during the work (e.g., silt curtains, if applicable), and on the equipment the contractor intends to use to place the imported fill. It is anticipated that there will be no need to utilize a temporary stockpile (underwater transfer pit).

Options for conveyance of dredged material from the Southwest Channel to the Northeast Basin include:

- **Cutter-suction dredge (Figure 30;** e.g., Fraser River Pile and Dredge's (FRPD) Sceptre Columbia) with floating pipeline to the Northeast Basin, with its discharge point moved regularly as filling proceeds. This is theoretically feasible, but likely not cost effective for this small volume of dredging;

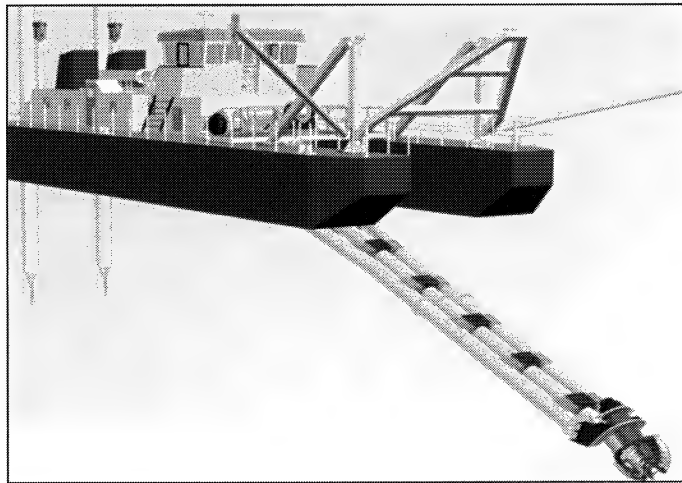


Figure 30 - Image of a Typical Cutter Suction Dredge

- **Hopper dredge (Figure 31,** e.g., the FRPD 309 trailing-arm suction hopper dredge), requires sufficient underwater clearance below keel to safely discharge the dredged material to the Northeast Basin. However, given the minimal underwater clearance at this Site, a hopper dredge like the FRPD 309 could only be utilized by pumping the dredged material through a floating pipeline over the Southern Intertidal Area to the Northeast Basin; or,

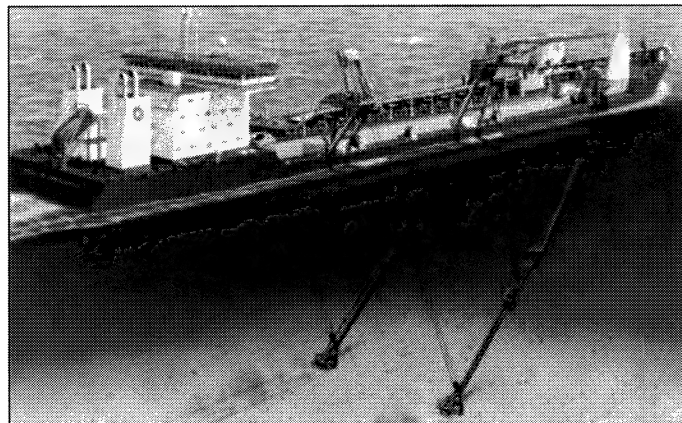


Figure 31 - Image of a Large Trailing-arm Suction Hopper Dredge

- **Clam-shell dredge (Figure 32, typical marine derrick operated by several local marine contractors)** loading onto flat-deck or bottom-dump scows, which would then be towed to the placement location (this option would be tide-limited for the higher elevations of fill placement, but is feasible). Flat-deck scows would be offloaded (slowly) by front-end loader equipment (**Figure 33**), whereas bottom-dump scows (**Figure 34**) would offload quickly by mechanical operation. Derricks with clam-shell buckets would be utilized in locations where front-end loaders may not have sufficient access such as tight corners and sides of fill areas. These derricks would also be utilized to adjust placed reclamation fill to meet design grades. Most marine contractors have access to both types of scow, so the choice would be based on cost, schedule and required environmental controls.

Given the minimal underwater clearance at this Site, it is likely that the contractor would prefer to use flat-deck scows. Bottom dump scows could be used for the initial reclamation filling at lower elevations in the Northeast Basin, but the contractor would have to change to flat-deck scows to complete the infilling work. Controlled dumping of reclamation fill in shallow layers may be difficult to achieve with bottom dump scows. It is highly unlikely that the contractor would, of their own volition, choose to include both types of scow and associated offloading equipment in their construction plans. Therefore, it is reasonable to assume that flat-deck scows offloaded by front-end loaders and marine derricks with clam-shell buckets would be the methods of choice.



Figure 32 - Clamshell Dredging

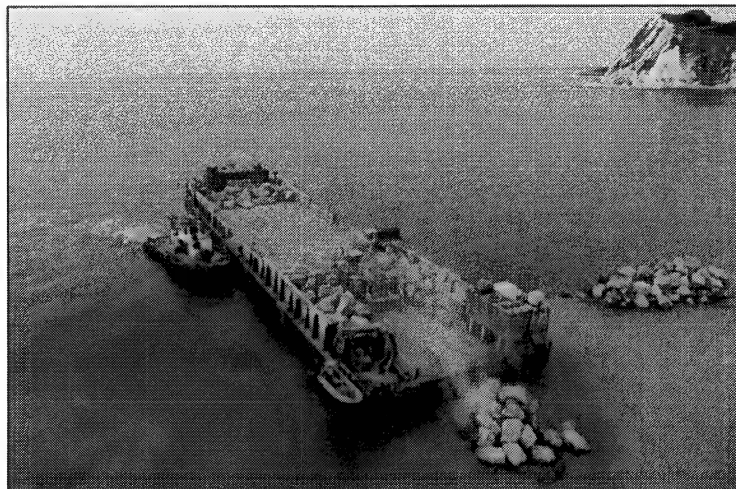


Figure 33 - Flat-Deck Scow (Off-loading by Front-end Loader)





Figure 34 - Bottom-Dump Scow (Empty)

Most of the above equipment would use spuds to stabilize vessel position during the work, or would be self-propelled in the case of the FRPD 309 vessel. Material scows would require temporary anchorage location(s) within the Maplewood Basin, and possibly other locations adjacent to the Site.

Multiple layers of reclamation fill are to be placed: the dredged material from the Southwest Channel (as described above), and imported sand fill. While it is anticipated that the dredged material from the Southwest Channel will be placed first, the contractor may elect to place either fill material as the initial lift. The imported sand is assumed (on the basis of cost-effectiveness and availability) to be sand generated by annual maintenance dredging of the Fraser River, commonly termed Fraser River Sand. However, other sand sources that meet the gradation and environmental quality requirements may be considered by the contractor (e.g., Sechelt sand or sand and gravel).

If Fraser River Sand is the chosen material, then it could be dredged, transported and placed by a trailing arm suction hopper dredge (such as the *FRPD 309*), which might utilize the newly formed Southwest Channel to access the Northeast Basin (if project timing allows), and discharge the fill through a short pipeline to a series of surface spigot points or by direct fan-spray if the vessel is close enough to the reclamation area. The *FRPD 309* is capable of both discharge options. Depending on the final chosen gradation of the fill material, it may be necessary to relocate the spigot point on a regular basis as filling proceeds, to avoid piling up the material at any one location (since the natural angle of repose underwater could be significantly steeper than the design grade of 2 %). The design surface elevation of the reclamation fill may be too high (relative to tidal elevations) for placement of all the sand fill by flat-deck scows with offload by front end loader, thus limiting the tidal windows during which scow offload can take place.

The softness of the existing seabed sediments within the Northeast Basin will require controlled placement of the dredged material and sand fill by placing in shallow lifts to prevent base failure and/or a "mud wave" effect. Base failure or development of a mud wave can be avoided through selection of a suitable fill placement plan and schedule.

For reclamation fill placement in the Northeast Basin below EL. -4.0 m CD, the initial filling would be completed in 1 m thick layers, each comprising two 0.5 m thick lifts, placed over the full Northeast Basin area, with a nominal 2-month waiting period after each layer for dissipation of excess pore pressure in the soft marine sediments prior to the placement of the next layer. The waiting period will be adjusted based on observational methods such as monitoring pore pressures in the marine sediments using vibrating wire piezometers, installed in the marine sediments prior to fill placement. The leads for the vibrating wire piezometers would be placed directly on the seabed and extend to a common area on the shoreline. All piezometer leads would be connected to a common data acquisition system.

The contractor will likely choose to fill the entire Northeast Basin to a nominal EL. -4.0 m CD initially, and then construct the perimeter rock dyke. Alternately, for scheduling or other reasons, the contractor may choose to place the rock dyke fill in thin layers coincident with the reclamation filling of the Northeast Basin.

Placement of the reclamation fill materials should be monitored by sounding surveys during construction and at completion. The sonar survey equipment and methods will need to be carefully calibrated and checked repeatedly to make sure accurate readings of the soft fill surface are being recorded.

### 3.3.2 Rock Structure Construction

Rock dyke and rock reefs are to be constructed once the infilling of the Northeast Basin (placed on the existing soft sediments) reaches an approximate uniform EL. -4.0 m CD within the entire Northeast Basin. Rock dyke and rock reefs can be constructed directly above the reclamation fill.

This initial infilling of the Northeast Basin to EL. -4.0 m CD would be followed by import and placement of the rock dyke core itself. Before general fill is placed in the Northeast Basin behind the dyke, either filter rock layer(s) and/or a geotextile fabric would be placed (underwater) on the northern slope of the dyke core to prevent loss of fines through the dyke. Installation of a geotextile fabric underwater can be difficult, but should be achievable in this relatively sheltered marine environment. All crushed rock materials would be sourced locally, likely from Texada Island or Sumas quarries.

The establishment of the rock reef in the Northeast Basin may be completed in conjunction with the construction of the dyke, or following completion of placement of fill. The schedule of this activity would be at the contractor's choice to suit construction schedule and equipment availability.

The rock placement work would be carried out by a clam-shell derrick (using computer-aided control and visualization in the cabin throughout) with rock supplied to site on flat-deck or bottom-dump scows. Partially-loaded scows may be required, to allow safe passage over the Southern Intertidal Area, if channel dredging is still ongoing at this time. The profile of the initial infilling of the Northeast Basin to EL. -4.0 m CD, dyke core, dyke filter and rock reef materials would be surveyed at each stage of construction for conformance to the design when complete.

### 3.4 Settlement

As noted in the geotechnical considerations outlined in Section 2.7, and **Appendix A**, material placed in the Northeast Basin will exhibit both short term settlement during fill placement and long-term post-construction settlement. This settlement is expected to occur both as a result of the self-weight of the infill material, and also by consolidation of the underlying soft sediments. The settlement in the marine sediments will vary with the thickness of the marine sediments, which was determined at three locations during the 2018 geotechnical exploration program. However, the effects of settlement may be more impactful on some parts of the design than others.

Construction settlement induced by the habitat fill placement within the Northeast Basin consists of:

- **Consolidation settlement of the soft sediment:** The spatial extent of the shallow soft sediments was not fully determined from the 2018 geotechnical exploration program, but could be locally up to 2 m thick. Fill induced short-term (i.e., during fill placement and the 2-month waiting periods between layers of fill placement) primary consolidation settlement in the soft sediments is estimated to be approximately 0.1 m to

0.2 m for up to 7.5 m high fill placed above the soft sediments. This settlement has been included in the assessment of the imported fill volume required;

- **Immediate settlement within the underlying native sand and gravel (with cobbles):** This is expected to occur immediately during fill placement and may be in the order of 0.1 m. This settlement has been included in the assessment of the imported fill volume required; and
- **Fill consolidation by its own weight:** The 3.5 m to 7.5 m fill thickness will be placed through the water in 0.5 m lifts and will be in a loose condition (assuming imported Fraser River Sand and/or Southwest Channel dredged material). The settlement induced by the fill's own weight is expected to be in the order of 0.3 m to 1.0 m and occurs during fill placement. However, the initial density of the fill is lower than the density of the fill on the barge. The fill is expected to consolidate to a density approximately equal to the density of the fill on the barge and this settlement was not included in the assessment of imported fill volume required.

Total construction settlement during construction is expected to range from about 0.5 m to 1.3 m based on the current design configuration. Approximately 0.2 m to 0.3 m of the total construction settlement is accounted for in the estimated fill volume required for the Northeast Basin.

Post-construction settlement will occur due to continued consolidation of the soft marine sediments. The estimated coefficient of consolidation requires approximately 2 to 3 years upon completion of fill placement to its final grade for the primary consolidation to occur within the soft sediment. Post-construction settlement may vary from about 0.1 m to 0.2 m.

By considering both the estimated short-term construction settlement and long-term post-construction settlement described above and the existing seabed elevations which show variations across the Northeast Basin, additional imported sand fill may be required to account for construction settlement. It is anticipated that an average of 500 mm of additional fill applied across half of the Northeast Basin intertidal flats and eelgrass habitats would account for expected construction settlement. This equates to an additional imported sand volume of approximately 9,000 m<sup>3</sup>.

The section of the MMRP most vulnerable to the effects of settlement is the eelgrass beds. Eelgrass in the South Coast region usually grows best at elevations between +0.5 m and -2.0 m CD, and the MMRP eelgrass bed design reflects this criterion. Therefore, localized settlement in this area is expected to be most critical to the success of the habitat establishment, and it is anticipated that the majority of settlement compensation would occur in this zone to maintain the desired elevation range once primary consolidation and settlement have occurred.

The intertidal habitat and the rock reef habitat are not expected to be as sensitive to settlement effects and therefore additional filling for settlement compensation may not be as extensive in these zones unless substantial settlement (greater than 250mm) is observed during construction.

### 3.5 Schedule

Construction of the Project is forecast to begin in late summer/early fall 2019 with an anticipated construction period of approximately eight months. The majority of the construction work is scheduled to occur during the appropriate least risk work windows for Burrard Inlet. The least risk work window to mitigate risk of impacts to juvenile salmonids is August 16th to February 28th. However, due to the potential material settlement time required for sediment placement in the Northeast Basin, material placement may extend beyond the end of the least risk work window (e.g., post-February 28th). Any work outside the window would occur with appropriate mitigation in place. Planting of donor eelgrass stock is expected to occur during the following summer (i.e., summer 2020, or 2021 pending construction completion). The Project construction schedule will be refined as the project advances to a procurement-ready stage.

### 3.6 Estimated Quantities

The MMRP will require the handling of material as a result of the dredging of the Southwest Channel, the placement of dredged material, and the placement imported fill (sands and rock) to form the intertidal flats, eelgrass beds and rock reefs. The anticipated fill volumes to be handled are outlined in **Table 10**.

Table 10 - Estimated Material Volumes

Area	Approximate Volume (m <sup>3</sup> )
Dredging of Southwest Channel	86,750
Imported Fill (river sand)	95,630
Imported Rock for revetment, dykes, reefs and rock apron	22,225

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## Appendix A - Geotechnical Review

## TECHNICAL MEMORANDUM

**TO:** Othman AlFaseeh

**DATE:** July 25, 2018

**FROM:** Ryan Liu, P.Eng.  
Steve Ahlfield, P.Eng.

**FILE NO:** P09948A02

**SUBJECT:** Geotechnical Input for 60% Design Phase  
UPDATED PER FIELD INVESTIGATIONS (Rev. 3)  
Maplewood Marine Restoration Project, North Vancouver, British Columbia

Klohn Crippen Berger (KCB) has prepared this technical memorandum providing geotechnical input update for the 60% design phase of the Maplewood Marine Restoration Project (MMRP). This technical memorandum provides preliminary geotechnical considerations based on a review of available geology maps, geotechnical reports prepared by others, limited site reconnaissance, geotechnical information collected from the 2018 geotechnical exploration program, and preliminary design configurations.

### 1 HISTORICAL SITE DEVELOPMENT

Hemmera (2015) summarizes the industrial historical development of the site based on a 1998 report by Port Metro Vancouver (PMV). The Hemmera report indicates that the uplands area of Maplewood foreshore was logged around the turn of the 20th century and the site has been developed by land reclamation and industry development in the upland and intertidal portions of the site over a period of almost 100 years. The site was dredged in the 1940s to 1960s, possibly for gravel extraction, and portions of the dredged area infilled between 1969 and 1979 to create upland areas that were used for wide range of industrial operations until the late 1980s. The dredged area was used for log sorting and storage operations from the 1940s to early 1980s.

### 2 GEOLOGY

Based on the Geological Map of the Vancouver Metropolitan Area (1998), the area consists of deposits of gravel and sand on marine deltas at valley mouths. Surficial Geology of Vancouver indicates the deposits belong to postglacial Salish Sediments SAi unit, which consists of mountain stream marine deltaic medium to coarse gravel and minor sand up to 15 m thickness or more.

### 3 PREVIOUS GEOTECHNICAL REPORTS AVAILABLE TO KCB

Golder Associates Ltd. (Golder) prepared a geotechnical assessment for VFPA Habitat Enhancement Program at Maplewood Log Pond, North Vancouver, BC for Moffatt & Nichol in 2013. This report referenced previous exploration programs either 400 m to the northwest of the subject site or within the subject site, consisting of:

- Golder's groundwater monitoring programs at Forester Street Waste Oil Re-refinery between 2002 to 2011. The site was located approximately 400 m to the northwest of the subject site.



The test holes extended to depths up to 6.7 m below grade. Test hole logs are not available to KCB;

- Golder's geotechnical program at Forester Street Heater Tower site during the year of 2011. The site was located approximately 400 m to the northwest of the subject site. Test hole logs are not available to KCB;
- Precision Identification's sediment sampling program (Hemmera, 2015) conducted on April 24, 2013 within the dredged portion of the site. The sampling program was conducted by divers who hand pushed 10 cm ID. plexiglass tubes into the seabed to refusal or a maximum depth of 1.1 m. Two sampling locations in the northern portion of the site currently proposed for habitat development indicated no refusal within the 1.1 m sampler length. Recovered soil samples consisted of fine-grained sediments comprised of soft silt or sandy silt.

The following soil conditions in a descending order was described by Golder at the Forester Street sites mentioned above:

- Marine Sand and Dredged Sand Fill: the unit generally ranged in thickness from 1.5 m to 2 m, terminating at an elevation of roughly 2.5 m above sea level. The deposit is loose.
- Clayey Silt: the unit varied in thickness from approximately 0.5 m to 1 m, terminating at approximately 1 m above sea level. The deposit is lightly over-consolidated.
- Sand and Gravel: with possible cobbles and boulders. The unit extended to the maximum depth of the investigations at an elevation of approximately 25 m below sea level with a thickness greater than 26 m. The unit was inferred to be compact to dense.

The fine-grained sediments sampled by divers in the Northeast Basin and Main Basin area may be relatively recent deposits that have accumulated since the area was dredged for gravel extraction.

#### 4 KCB SITE RECONNAISSANCE

KCB carried out a brief site reconnaissance on October 14, 2017 during the low tide period. The west shore of the site (to the west of the Main Basin) was traversed by foot. The surficial soil deposits in the area consisted of rounded to sub-rounded cobbles and gravels underlain by fine to medium sand with traces of silt to some silt and clay. Local areas of fine-grained surficial soils were observed in some areas. Ponded water was noted in several areas, which indicates the presence of relatively impermeable fine-grained soil at shallow depth, which may or may not be of significant thickness. Large penetrometer readings in areas of exposed SAND/silty SAND/sandy SILT ranged from 10 psi to 46 psi indicating variable ground conditions. The lower readings were mostly for saturated sandy SILT. Desiccation cracks were observed in the fine-grained soils at the northwestern corner of site and indicate the potential presence of CLAY material (either silty CLAY or clayey SILT) of unknown thickness. See photos 1 to 3 included in **Appendix I – Selected Site Photographs**.

Hard sandy gravelly SILT was observed on the exposed eroded side slope approximately 0.5 to 1 m high on the western side of the Northeast Basin (see Photos 4 and 5 in Appendix I). The nature of this

hard SILT was not determined from this site reconnaissance, and is likely to be fill based on the site development history and our review of historical aerial photos presented in Section 5.

On the western side of the Northeast Basin, the rounded promontory includes a large quantity of broken asphalt and concrete (no rebar, see Photos 6 and 7 in Appendix I), which appears to have been dumped there historically.

The east shore of the site (to the east of the Northeast Basin) was not traversed but seemed (visually) to consist of similar surficial materials as the west shore (to the west of the Main Basin).

The site reconnaissance focussed on the surficial areas of the mudflats with estimated ground level of El. 1.0 m to El. 3.0 m Chart Datum.

The following were also noted during the site reconnaissance:

- There is a log boom strung across the west bay (to the northwest of the Main Basin, see Photo 8 in Appendix I). Its purpose may be to discourage log build-up on the natural salt marsh, which exists north of the log booms.
- Under the foot bridge at the northwest corner of the Northeast Basin (see Photos 9 and 10), there is a historic dredged barge channel and a trapped pool (upstream of the bridge), which could be affected by the proposed infilling if infilling elevations are higher than the stream.

## 5 HISTORICAL AERIAL PHOTO REVIEW

Scanned copies of aerial photos of the subject area were obtained from VFPA, dated 1926, 1946, 1957, 1963, 1974, 1979, 1984, 1991, 1992, 1997, and 2009. By visual inspection, dredging of the Main Basin area occurred during time periods between 1946 and 1957 and dredging of the Northeast Basin mainly between 1957 and 1963. Fill placement occurred from Dollarton Highway southwards within the dredged areas to the current northern boundary of the Main Basin, and western and northern boundary of the Northeast Basin between 1963 and 1979. The shapes of the Main Basin and Northeast Basin have stayed approximately the same since 1979. The channel to the north of the current footbridge was formed from an area originally dredged but not subsequently backfilled. Current side slopes (at foreshore) exposed on the north side of the Main Basin, and west and north side of the Northeast Basin consist of fill materials.

The review of historical aerial photos and bathymetry indicates that:

- Fill is the dominant type of surficial materials to the north of the northern boundary of the Main Basin, and to the west and north of the Northeast Basin.
- The existing ground slopes interpreted from the bathymetric survey on the north side of the Main Basin, and west and north side of the Northeast Basin may not represent true native soil repose angles (because this is predominantly fill material).
- There was no evidence that the foreshore slopes in other parts of the subject area were modified artificially by backfilling activities.

## 6 GROUND CONDITIONS FROM 2018 GEOTECHNICAL FIELD EXPLORATION PROGRAM

KCB conducted a 2018 geotechnical exploration program as part of the MMRP preliminary design and prepared a geotechnical data report dated June 27, 2018. Nine (9) sonic Drill Holes (DH) and seven (7) Cone Penetration Testing (CPT) holes were advanced during the field program. For reference, the 2018 Geotechnical Exploration Testing Location Plan is attached.

Sonic drilling was conducted using a 15 cm (6") diameter core barrel. The core barrel size limits the maximum size of materials recovered; therefore, large cobbles and boulders, if present, could not be collected in the drill holes. Therefore, the ***presence of large cobbles and boulders within the subject site is possible***. The contractors bidding on this project should make their own assessment of potential material types for selection of equipment.

The following subsections summarize ground conditions interpreted or inferred from the drill holes and CPT holes advanced for the MMRP.

### 6.1 Southwest Channel

DH18-03/CPT18-03, DH18-05, and DH18-09 were advanced at the proposed Southwest Channel area.

CPT18-03 encountered CPT cone tip practical refusal (for a cone with a total tip capacity of 150 MPa) at 0.68 m depth due to the inferred presence of coarse-grained soil. Soft sediment is interpreted to be present to 0.20 m depth.

Soil recovery rates from all three sonic drill holes ranged from 0 to 100% with an average recovery rate of approximate 60%. It was not determined whether the coarse-grained soil zones (such as Gravel and Sand with cobbles) or the relatively fine-grained soil zones (such as Sand and Silt) have lower soil recovery rates. With generally low soil recovery rates being encountered during the drilling program, especially when cobbles were actually recovered or inferred to be present, exact soil types purely based on laboratory soil gradation tests will be biased by the maximum particle size collected. In general, the soft sediment –Silt (MH) had a thickness less than 0.20 m below existing sea bed in the Southwest channel area. A mixture of cobbles, gravel, and sand was the dominant soil matrix in the area underneath the soft sediment. Based on recovered soil, it was estimated that cobbles, sub-angular to sub-rounded, could be up to 30% by volume in certain areas and up to 125 mm in size. Fine to coarse gravel and fine to coarse sand were distributed throughout the area with certain areas having more gravel than sand or vice versa.

The proposed bottom of the Southwest Channel is approximate El. -4.0 m (Chart Datum). The existing ground at this elevation consists of Gravel and Sand from the middle of the channel to the northern end of the channel, while Sand with trace to some silt predominates from the middle of the channel to the southern end of the channel.

## 6.2 Main Basin

DH18-01/CPT18-01, DH18-02/CPT18-02, and DH18-04/CPT18-04 were advanced in the Main Basin.

Table 1 summarizes CPT cones used, and CPT practical refusal depths for the CPTs performed in the area.

**Table 1 Summary of CPTs In Main Basin Area**

	CPT18-01	CPT18-02	CPT18-04
Cone Total Capacity (MPa)	37.5	150	37.5
Practical Refusal Depth (m)	2.775 <sup>2</sup>	3.325 <sup>2</sup>	2.25 <sup>1</sup>

Note: <sup>1</sup>. Inferred practical refusal on cobble. <sup>2</sup>. Inferred practical refusal in gravel zones with cobbles.

Soil recovery rates from all three sonic drill holes ranged from 16 to 100% with an average recovery rate of approximate 65%. It was not determined whether the coarse-grained soil zones (such as Gravel and Sand with cobbles) or the relatively fine-grained soil zones (such as Sand, silty Sand) have lower soil recovery rates. With generally low soil recovery rates encountered during the drilling program, especially when cobbles were actually recovered or inferred to be present, exact soil types based on laboratory soil gradation tests will be biased by the maximum particle size recovered.

Inferred soft sediment depths from CPTs were 0.05 m at CPT18-01, 0.40 m at CPT18-02, and 1.5 m at CPT18-04. The soft sediment thickness generally increased from the southeastern corner of the Main Basin to the northwestern corner of the Main Basin, which is generally consistent with the 2013 Precision Identification's diver sediment sampling program.

The soft sediments were underlain by a mixture of cobbles, gravel, and sand. Based on recovered soil, it was estimated that cobbles, sub-angular to sub-rounded, could be up to 40% by volume in certain areas and up to 130 mm in size, although the recovery size may have been limited by the 150 mm core barrel diameter. Fine to coarse gravel and fine to coarse sand were distributed throughout the area with certain areas having more gravel than sand or vice versa.

## 6.3 Northeast Basin

DH18-06/CPT18-06, DH18-07/CPT18-07, and DH18-08/CPT18-08 were advanced in the Northeast Basin.

Table 2 below summarizes CPT cones used, and CPT practical refusal depths for the CPTs performed in the area.

**Table 2 Summary of CPTs In Northeast Basin Area**

	CPT18-06	CPT18-07	CPT18-08
Cone Total Capacity (MPa)	37.5	37.5	37.5
Practical Refusal Depth (m)	1.725 <sup>1</sup>	2.200 <sup>1</sup>	1.425 <sup>1</sup>

Note: <sup>1</sup>. Inferred practical refusal in gravel zones with cobbles.

Soil recovery rates from all three sonic drill holes ranged from 5 to 82% with an average recovery rate of approximate 50%. It was not determined whether the coarse-grained soil zones (such as Gravel and Sand with cobbles) or the relatively fine-grained soil zones (such as Sand, silty Sand) have lower soil recovery rates. With generally low soil recovery rates encountered during the drilling program, especially when cobbles were actually recovered or inferred to be present, exact soil types based on laboratory soil gradation tests will be biased by the maximum particle size recovered.

Inferred soft sediment depths from CPTs were 1.3 m at CPT18-06, 2.0 m at CPT18-07, and 1.3 m at CPT18-08. At these depths, waste wood debris were recovered in the soil cores from the adjacent sonic drill holes.

A mixture of cobbles, gravel, and sand was the dominant soil matrix in the area underneath the soft sediment. Based on recovered soil, it was estimated that cobbles, sub-angular to sub-rounded, could be up to 40% by volume in certain areas and up to 125 mm in size. Fine to coarse gravel and fine to coarse sand were distributed throughout the area with certain areas having more gravel than sand or vice versa.

## 7 UNDERSTANDING OF PRELIMINARY DESIGN

The preliminary design drawings (Dwgs. 81-003-101, 81-003-200, and 81-003-201) are developed for the Maplewood Marine Restoration Project are based on Hydrographic datum (Chart Datum), which is nominally 3.0 m below Geodetic datum (GCVD28,GVRD2005). The drawings indicate that the MMRP includes two main components:

- **Southwest Channel:** A 40-m wide (bottom of the channel) by 300-m long channel dredged at the southwest corner of the Main Basin. The bottom of the channel is at El. -4.0 m and the top of the channel has elevations ranging from El. +2.5 m at the northern end to El. 0.0 m at the southern end. Rock reefs will be placed on both sides of the bottom of the channel with the middle portion (20 m wide) of the bottom of the channel consisting of native soil exposed by dredging. Slope revetment will be placed on both eastern and western side slopes of the channel to the top of channel; and,
- **Northeast Basin:** In the Northeast Basin, potential dredged material from the Southwest Channel and imported Fraser River sand will be placed as reclamation fill within the basin boundary. A rockfill dyke will be constructed to contain the reclamation fill placed at higher elevation. A rock reef arrangement will be constructed in front of (south of) the rockfill dyke. The top of the fill placed behind the rock dyke has an overall maximum slope of 2.0% (but closer to 1.5% on average) varying from approximate El. +2.05 m at the north end to El. -2.0 m behind the top of the rock dyke. The bottom of the rock dyke is at nominal El. - 4.0 m.

The bathymetric survey information available for the site indicates that the proposed habitat area is in the former dredged area with the lowest bottom at El. -7.5 m located in the Northeast Basin. The former dredged area bottom is relative flat (flatter than 10H:1V). The fill and native soil side slopes (on the eastern side of the Northeast Basin and the western side of the Main Basin) of the former dredge area extend from El. -5.0 m to -El. +3.0 m and the slopes range from 4H:1V to 2.5H:1V. The existing foreshore slopes to the south of the Southwest Channel range from 2.7H:1V at the channel location to about 5.4H:1V in the area east of the channel.

Based on the proposed fill elevation in the Northeast Basin ranging from El. + 2.0 m to El. -2.0 m and the existing basin bottom at nominally El. -7.5 m, and without considering removal of soft sediment from the seabed in the Northeast Basin, a 3.5 m to 7.5 m thickness of fill needs to be placed for the project.

## 8 GEOTECHNICAL INPUT

Table 3 below summarizes elevations of various items of interest for this project.

**Table 3 Summary of Elevations of Various Items of Interest**

Source	Items	Hydrographic Elevation (m)	Geodetic Elevation (m)
Bathymetric Survey	Existing Seabed for the proposed Habitat Area in the Northeast Basin	-7.5	-10.5
	Existing Grade at the proposed access channel	2.0 to 2.5	-1.0 to -0.5
KCB Site Reconnaissance	Estimated Existing Mudflat Top Elevation	1.0 to 3.0	-2.0 to 0.0
Golder's Geotechnical Report	Bottom of Marine Sand and Dredged Sand Fill	5.5	2.5
	Bottom of Clayey Silt	4.5	1.0
	Bottom of Sand and Gravel	<-22.0	<-25.0

Based on the ground conditions obtained from the 2018 exploration program and the various elevations shown in Table 3, the native sand and gravel with cobbles (similar to those identified in Golder's report) underlying soft silt sediment are the dominant soil types in the proposed habitat and channel areas and extend to relatively great depth beyond the currently proposed development. The existing fill and native soils side slopes adjacent to the Northeast Basin are nominally 4H:1V and the seabed has slope ratios of 10H:1V or flatter according to the bathymetric survey information.

Historical records indicate that the existing Main Basin and Northeast Basin areas were formed from historical dredging activities. The native sand and gravel with cobbles currently present within the subject site is deemed dredgeable with proper equipment.

Inferred soft sediments were up to 1.5 m thick in the Main Basin and 2.0 m in the Northeast Basin. The fine-grained soft sediments in the Northeast Basin and Main Basin area are interpreted to be relatively recent deposits that have accumulated by sedimentation from seawater since the area was dredged for gravel extraction. The main geotechnical challenge faced with by the proposed development is the low shear strength of the newly deposited soft sediment, and fill placement rates

must be controlled to prevent bearing capacity failure and slope instability. Long term consolidation settlement of the soft sediment must be considered in the selection of finished site grades.

## 8.1 Total Settlement

The estimated soft sediment soil properties used for KCB's geotechnical analyses are summarized in Table 4 below.

**Table 4 Estimated Soft Sediment Soil Properties**

Material	Total Unit Weight, $\gamma$ (kN/m <sup>3</sup> )	Initial Undrained Shear Strength, $C_u$ (kPa)	Natural Moisture Content, $\omega$ (%)	Liquid Limit (%)	Estimated Compression Index, $C_c$	Estimated Coefficient of Consolidation, $C_v$ (cm <sup>2</sup> /second)
Soft sediment – Silt (MH)	16	2	127	68	0.5	$1 \times 10^{-4}$

The compression index ( $C_c$ ) and coefficient of consolidation ( $C_v$ ) are two critical parameters for determination of consolidation settlement and its time rate. These parameters were not actually measured due to technical difficulties in performing laboratory tests for one-dimensional consolidation properties using incremental loading on the soft sediment samples, but instead were obtained through empirical correlations with soil index properties. There are uncertainties on how representative these estimated values are for the site specific soft sediments encountered. Refining these parameters is recommended by using data to be collected through geotechnical instrumentation during construction.

Construction settlement induced by the habitat fill placement within the Northeast Basin consists of:

- **Consolidation settlement of the soft sediment.** The spatial extent of the shallow soft sediments was not fully determined from the 2018 geotechnical exploration program, but could be locally up to 2 m thick. Fill induced short term (i.e., during the fill placement and hold periods) primary consolidation settlement in the soft sediments is estimated to be approximately **0.1 m** to 0.2 m for up to 7.5 m high fill to be placed above the soft sediments. This settlement should be included in the assessment of the imported fill volume required;
- **Immediate settlement within the underlying native sand and gravel (with cobbles):** this is expected to occur immediately during fill placement and may be in the order of 0.1 m. This settlement should be included in the assessment of the imported fill volume required; and
- **Fill's consolidation by its own weight.** The 3.5 m to 7.5 m fill thickness will be placed through the water in 0.5 m lifts and will be in a loose condition (assuming imported Fraser River Sand and/or Southwest Channel dredged material). The settlement induced by the fill's own weight is expected to be in the order of 0.3 m to 1.0 m and occurs during fill placement. However, the initial density of the fill is lower than the density of the fill on the barge. The fill is expected to consolidate to a density approximately equal to the density of the fill on the

barge and this settlement should not be included in the assessment of imported fill volume required.

Total short-term settlement during construction is expected to range from about 0.5 m to 1.3 m based on the current design configuration. The required fill volume should consider a construction settlement of 0.2 m to 0.3 m.

Post-construction settlement will occur due to continued consolidation of the soft marine sediments. The estimated coefficient of consolidation requires approximately 2 to 3 years upon completion of fill placement to its final grade for the primary consolidation to occur within the soft sediment. Post-construction settlement may vary from about 0.1 m to 0.2 m. If the elevations of completed components have low tolerances on upward or downward elevations from design elevations (e.g. +/- 0.1 m), settlement monitoring should be carried out during construction and the thickness of the last lift of fill adjusted to suit the measured settlement rates and magnitudes and super-elevated to account for long-term settlement. However, if a larger tolerance (say +/- 0.5 m) is acceptable, then there may be no need for super-elevation of the finished site grade. Delaying the final grading lift for eel grass bedding for several months would allow higher settlement to occur during the construction period and reduce post-construction settlement.

## 8.2 Bearing Capacity

The existing soft sediment had an undrained shear strength of approximately 2 kPa as shown in Table 4 and an ultimate bearing resistance of about 10 kPa, which equates to the effective stress generated by 1 m high mineral soil placed underwater. Therefore, the initial fill lifts must not exceed 1 m to prevent bearing failure. Once the initial fill is placed, the undrained shear strength of the soft sediment will gradually increase as excess pore water pressure dissipates and the ultimate bearing resistance will increase. KCB estimates that a 0.5 m thickness of mineral non-organic fill (with a total unit weight between 18 kN/m<sup>3</sup> and 22 kN/m<sup>3</sup>) placed underwater will increase the undrained shear strength by 1 kPa once excess pore water pressure in the soft sediment is completely dissipated. KCB recommends that staged construction of fill placement be adopted, and a waiting period be planned after each stage of fill placement.

The recommended maximum filling height for each stage is 1 m placed in two 0.5 m thick lifts over the full Northeast Basin area, and a nominal 2-month waiting period for dissipation of excess pore pressures prior to the placement of the next lift. The waiting period can be adjusted based on observational methods such as monitoring pore pressures (recorded by vibrating wire piezometers installed in the soft sediments prior to fill placement). Since the existing bottom of the Northeast Basin has local areas with an elevation as low as -7.5 m, the initial fill stages will be confined to these local low areas. Bulk backfilling (with large areal coverage) is anticipated above EL. -5.0 m to a final grade elevation about ~EL. -2.0 m. The last stage of fill placement would be the grading of the eel grass bed and tidal flats. Without the benefit of fill placement observation presently, it is estimated that approximate 8 months are needed for fill placement to final grade.



## 8.3 Slope Stability

### 8.3.1 Northeast Basin Habitat Area

KCB understands that the slopes in the habitat restoration area will not be designed for seismic loading, as no marine structures are present as part of the habitat works.

The soft sediments that have accumulated in the proposed habitat fill area in the Northeast Basin will control the stability of the fill slopes. Fills must be placed in stages to prevent bearing capacity failure and displacement of the soft sediments as recommended in Section 8.2. By adopting the staged fill placement as recommended in this memorandum, the preliminary design configuration will have static minimum factor of safety greater than 1.5.

During interim placement, KCB recommends that each lift of fill be placed gently (without free dropping from heights) to a level grade without forming slopes above the soft sediment to prevent displacement of soft sediment or mud waves from occurring.

The fill south of the proposed rock dyke is expected to be tied into the existing ground surrounding the Northeast Basin except the southwestern end where fills are expected to be approximately 1 m higher than the existing ground and therefore a fore slope is anticipated. At this location, the end slope is recommended to be no steeper than 5H:1V.

### 8.3.2 Southwest Channel

From geotechnical slope stability point of view, the recommended dredge slopes for the Southwest Channel are 3H:1V or flatter based on our interpretation of the existing southern foreshore slopes immediately south of the Southwest Channel and the subsurface ground conditions obtained from the 2018 geotechnical exploration program. For long term slope stability consideration, the recommended 3H:1V (or flatter) dredged slopes will have an approximate static minimum factor of safety of 1.5. KCB understands that the dredged slopes will not be designed for seismic loading.

## 8.4 Gradations for Fill Materials

Assuming the rip-rap is placed in a constant nominal thickness within the Southwest Channel, the final riprap slope will generally be consistent with the dredge cut slope. Filter material may be required between the riprap and native materials in the dredge cut, if large riprap is required.

Imported General Fill (for the eelgrass and intertidal area and below the rock dyke) at the Northeast Basin should consist of durable, natural granular material, free of organics, with no more than 8% by weight passing the 75 µm (No. 200) sieve from a geotechnical perspective. Environmental considerations may favour a lower percentage of materials <0.075 mm. The maximum particle size of imported fill should not exceed 150 mm. Recycled materials from off-site sources, including but not limited to concrete, asphalt pavement, and glass, should not be used as fill. Fraser River sand generally meets this gradation specification. Oversized particles (with diameter greater than 150 mm) may be present in the Southwest Channel dredged material based on the 2018 geotechnical exploration results and depositional environment in the area. The Southwest Channel dredged

material is expected to generally meet this gradation specification. Fill gradation requirements for eelgrass growing medium and the final grading of the intertidal area should be assessed from a biological perspective.

A filter layer or geotextile may be required between the rock dyke core layer and the imported fill in the Northeast Basin. A filter layer may also be required between the rock dyke core and the riprap slope protection layer on the dyke face. The filter layers should consist of hard, durable pit run or crushed sand and gravel free from organic materials.

## 8.5 Recommended Geotechnical Instrumentation During Construction

KCB recommends, a minimum of four (4) Vibrating Wire (VW) piezometers be installed in the soft sediments in the Northeast Basin area by the Contractor during construction. Two (2) VW piezometers should be aligned in a N-S direction in the middle portion of the Northeast Basin and the other two (2) VW piezometers aligned along the proposed rock dyke. The purpose of these VW piezometers is to record pore pressures changing with time within the soft sediment upon fill placement to determine when the next lift of fill can be placed. The Contractor can select the VW piezometers installation method. KCB envisaged that the VW piezometers could be installed by pushing them into the soft sediments from a boat and then carefully placing the readout wires for the VW piezometers along the sea bed to a common location in the uplands area. Readout wires should 'snaked' along the seabed to provide slack for adjustment to settlement. All VW piezometers should be connected to a data logger chamber installed onshore. Data recorded in the data loggers will be interpreted at selected time intervals and timing for the next lift of fill placement can be determined.

As mentioned in Section 8.1, settlement monitoring is recommended if the final grade has low tolerances on upward or downward elevations from design elevations (e.g. +/- 0.1 m) so that the final lift of fill can be adjusted to suit the measured settlement rates and magnitudes.

## 9 LIMITATIONS OF TECHNICAL MEMORANDUM

This technical memorandum is an instrument of service of Kloth Crippen Berger Ltd. The technical memorandum has been prepared for the exclusive use of AECOM Canada and Vancouver Fraser Port Authority for the specific application to the Maplewood Marine Restoration Project. The technical memorandum's contents may not be relied upon by any other party without the express written permission of Kloth Crippen Berger. In this technical memorandum, Kloth Crippen Berger has endeavoured to comply with generally-accepted professional practice common to the local area. Kloth Crippen Berger makes no warranty, express or implied.

The analyses, conclusions and recommendations contained in this technical memorandum are based on data derived from a limited number of test holes obtained from widely spaced subsurface explorations. The methods used indicate subsurface conditions only at the specific locations where samples were obtained or where in-situ tests would infer, only at the time they were obtained, and only to the depths penetrated. The samples and tests cannot be relied on to accurately reflect the nature and extent of strata variations that usually exist between sampling or testing locations.

The recommendations included in this report have been based in part on assumptions about strata variations between test holes that will not become evident until construction or further investigation. Accordingly, Kloth Crippen Berger should be retained to perform construction observation and thereby provide a complete professional geotechnical engineering service through the observational method. If variations or other latent conditions become evident during construction, Kloth Crippen Berger will re-evaluate this technical memorandum's recommendations. Kloth Crippen Berger cannot assume responsibility or liability for the adequacy of its recommendations when they are used in the field without Kloth Crippen Berger being retained to observe construction.

Although Kloth Crippen Berger has explored subsurface conditions as part of this program, Kloth Crippen Berger has not conducted analytical laboratory testing of samples obtained, has not evaluated the site for potential presence of contaminated soil, and has not evaluated groundwater conditions.

## 10 CLOSING

We trust this technical memorandum provides the information you require for updating your 60% design phase submission. Please contact us if you have any questions or concerns.

**KLOHN CRIPPEN BERGER LTD.**

Bingsheng (Ryan) Liu, Ph.D., P.Eng.  
Senior Geotechnical Engineer

Reviewed by: Steven R. Ahlfield, P.Eng.  
Principal, Senior Geotechnical Engineer

Cc: Neil Snowball, AECOM Project Manager  
Geoff Cooper, KCB Project Manager

Figure 1 2018 Geotechnical Exploration Testing Location Plan  
Appendix I: Selected Site Photographs

## FIGURES

Figure 1 – 2018 Geotechnical Exploration Testing Location Plan






NOTES

1. ELEVATIONS ARE TO CHART DATUM WHICH IS 2.975M BELOW GEODETIC DATUM
2. BACKGROUND IMAGES OBTAINED FROM ESRI WORLD IMAGERY - DISTRICT OF NORTH VANCOUVER (2015-01-15) AND ESRI WORLD IMAGERY - BURNABY, BC (2015-01-15)
3. CIVIL DESIGN BASE PLAN FROM ALSCOM PRELIMINARY 40% DESIGN DRAWING 81-003-12
4. REV. B DATED 2017-02-25

LEGEND

- ▲ 2018 CONE PENETRATION TEST'S
- 2018 SONIC DRILL HOLE
- EXISTING 1.0m CONDUIT

		NOT FOR CONSTRUCTION		MAPLEWOOD MARINE RESTORATION PROJECT	
 PORT of vancouver	 Klohn Crippen Berger	R/L		2018-06-27	
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		1:5,000		P09948402	
				1	

## APPENDIX I

### Selected Site Photographs

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**Photo 1: Surficial Cobbles and Gravels to the northwest of the Main Basin**



**Photo 2: Surficial soil deposits with ponded water looking south along the west shore of the Main Basin**



**Photo 3: Desiccation Cracks looking north at the northwestern corner of the Main Basin**



**Photo 4: Eroded Side Slope (looking north along west side of the Northeast Basin)**



**Photo 5: Eroded Side Slope (looking south along west side of the Northeast Basin)**



**Photo 6: Asphalt and Concrete (looking north along west side of the Northeast Basin)**





**Photo 7: Asphalt and Concrete (looking south along west side of the Northeast Basin)**



**Photo 8: Log Boom and Soil Deposits (looking south at the west shore of the Main Basin)**



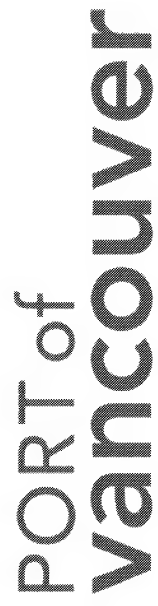
**Photo 9: Historic Dredged Barge Channel and Trapped Pool (looking north towards the foot bridge)**



**Photo 10: Historic Dredged Barge Channel and Trapped Pool (looking south under the foot bridge)**



## Appendix B - Engineering Design Drawings

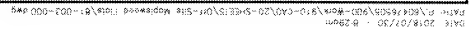


## DRAWING INDEX

# AECOM



Klohn Crippen Berger







LEGEND	
---	PROPOSED 100% NEW SOUTHWEST CHANNEL
---	EXISTING CONTOURS
---	VEGETATION
---	ARCHAEOLOGICAL SITE (PROPOSED INTERPRETATION)

**REVISIONS**

1. ALL ELEVATIONS TO CHART DATUM (TD)
2. ALL CONTOURS ARE ON METERS AND ARE NOT AT 10% INTERVAL
3. ALL CONTOURS ARE ON METERS AND ARE NOT AT 10% INTERVAL
4. ALL CONTOURS ARE ON METERS AND ARE NOT AT 10% INTERVAL
5. ALL CONTOURS ARE ON METERS AND ARE NOT AT 10% INTERVAL
6. ALL CONTOURS ARE ON METERS AND ARE NOT AT 10% INTERVAL
7. ALL CONTOURS ARE ON METERS AND ARE NOT AT 10% INTERVAL
8. ALL CONTOURS ARE ON METERS AND ARE NOT AT 10% INTERVAL
9. ALL CONTOURS ARE ON METERS AND ARE NOT AT 10% INTERVAL
10. ALL CONTOURS ARE ON METERS AND ARE NOT AT 10% INTERVAL



# **SITE PLAN**

<p><b>PRELIMINARY 60% DESIGN</b></p> <p>DATE: 2017-10-25</p> <p>SCALE: AS SHOWN</p> <p>PROJECT: MAPLEWOOD MARINE RESTORATION PROJECT</p> <p>SITE PLAN &amp; GENERAL NOTES</p>		<p><b>PORT OF VANCOUVER</b></p> <p><b>AECOM</b></p> <p><b>Klohn Crippen Berger</b></p>	<p><b>MAPLEWOOD MARINE RESTORATION PROJECT</b></p> <p><b>SITE PLAN &amp; GENERAL NOTES</b></p> <p>DATE: 2017-10-25</p> <p>SCALE: AS SHOWN</p> <p>PROJECT: MAPLEWOOD MARINE RESTORATION PROJECT</p> <p>SITE PLAN &amp; GENERAL NOTES</p>
<p>NO. 1</p> <p>DATE: 2017-10-25</p> <p>SCALE: AS SHOWN</p> <p>PROJECT: MAPLEWOOD MARINE RESTORATION PROJECT</p> <p>SITE PLAN &amp; GENERAL NOTES</p>	<p>NO. 2</p> <p>DATE: 2017-10-25</p> <p>SCALE: AS SHOWN</p> <p>PROJECT: MAPLEWOOD MARINE RESTORATION PROJECT</p> <p>SITE PLAN &amp; GENERAL NOTES</p>	<p>NO. 3</p> <p>DATE: 2017-10-25</p> <p>SCALE: AS SHOWN</p> <p>PROJECT: MAPLEWOOD MARINE RESTORATION PROJECT</p> <p>SITE PLAN &amp; GENERAL NOTES</p>	<p>NO. 4</p> <p>DATE: 2017-10-25</p> <p>SCALE: AS SHOWN</p> <p>PROJECT: MAPLEWOOD MARINE RESTORATION PROJECT</p> <p>SITE PLAN &amp; GENERAL NOTES</p>
<p>NO. 5</p> <p>DATE: 2017-10-25</p> <p>SCALE: AS SHOWN</p> <p>PROJECT: MAPLEWOOD MARINE RESTORATION PROJECT</p> <p>SITE PLAN &amp; GENERAL NOTES</p>	<p>NO. 6</p> <p>DATE: 2017-10-25</p> <p>SCALE: AS SHOWN</p> <p>PROJECT: MAPLEWOOD MARINE RESTORATION PROJECT</p> <p>SITE PLAN &amp; GENERAL NOTES</p>	<p>NO. 7</p> <p>DATE: 2017-10-25</p> <p>SCALE: AS SHOWN</p> <p>PROJECT: MAPLEWOOD MARINE RESTORATION PROJECT</p> <p>SITE PLAN &amp; GENERAL NOTES</p>	<p>NO. 8</p> <p>DATE: 2017-10-25</p> <p>SCALE: AS SHOWN</p> <p>PROJECT: MAPLEWOOD MARINE RESTORATION PROJECT</p> <p>SITE PLAN &amp; GENERAL NOTES</p>
<p>NO. 9</p> <p>DATE: 2017-10-25</p> <p>SCALE: AS SHOWN</p> <p>PROJECT: MAPLEWOOD MARINE RESTORATION PROJECT</p> <p>SITE PLAN &amp; GENERAL NOTES</p>	<p>NO. 10</p> <p>DATE: 2017-10-25</p> <p>SCALE: AS SHOWN</p> <p>PROJECT: MAPLEWOOD MARINE RESTORATION PROJECT</p> <p>SITE PLAN &amp; GENERAL NOTES</p>	<p>NO. 11</p> <p>DATE: 2017-10-25</p> <p>SCALE: AS SHOWN</p> <p>PROJECT: MAPLEWOOD MARINE RESTORATION PROJECT</p> <p>SITE PLAN &amp; GENERAL NOTES</p>	<p>NO. 12</p> <p>DATE: 2017-10-25</p> <p>SCALE: AS SHOWN</p> <p>PROJECT: MAPLEWOOD MARINE RESTORATION PROJECT</p> <p>SITE PLAN &amp; GENERAL NOTES</p>

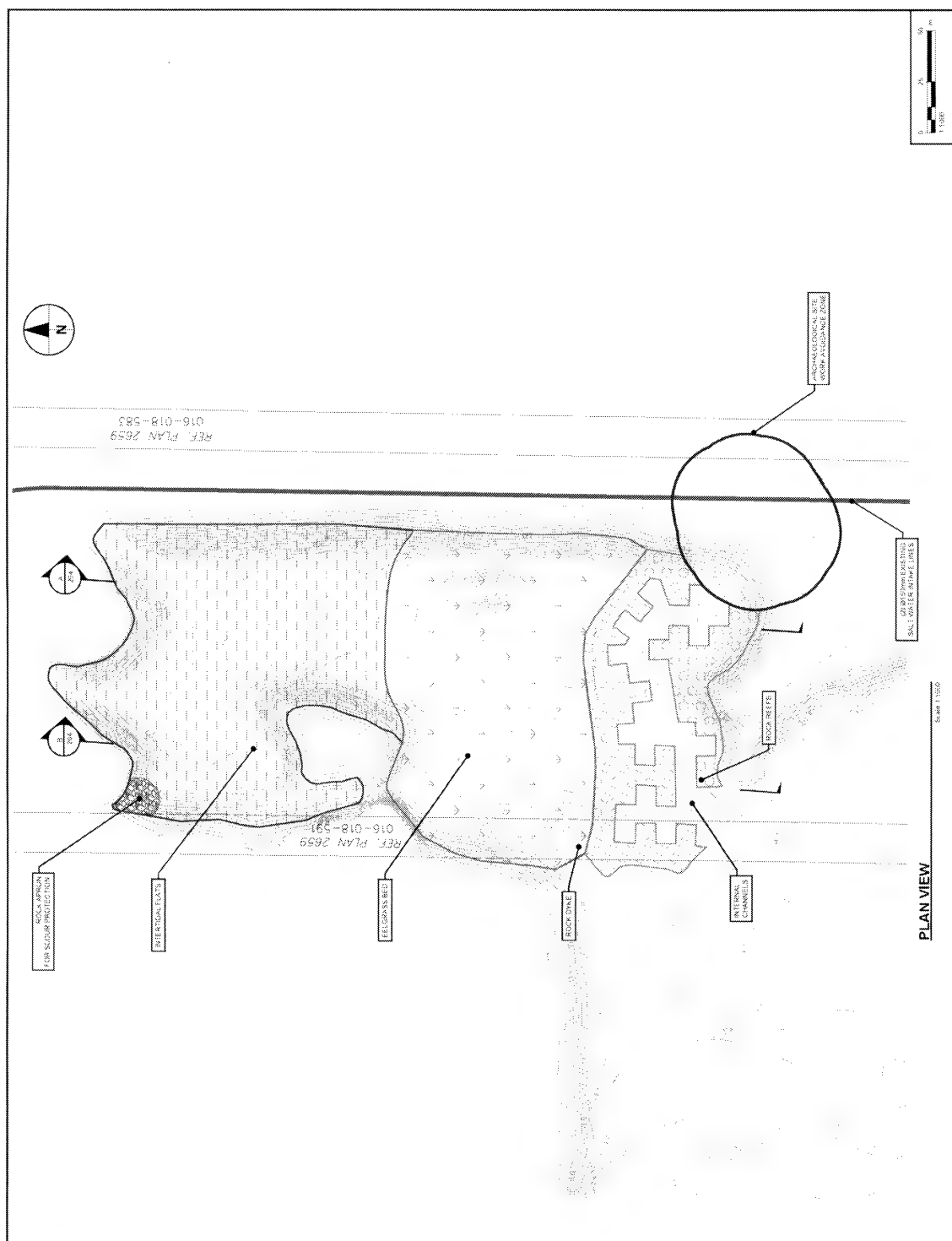


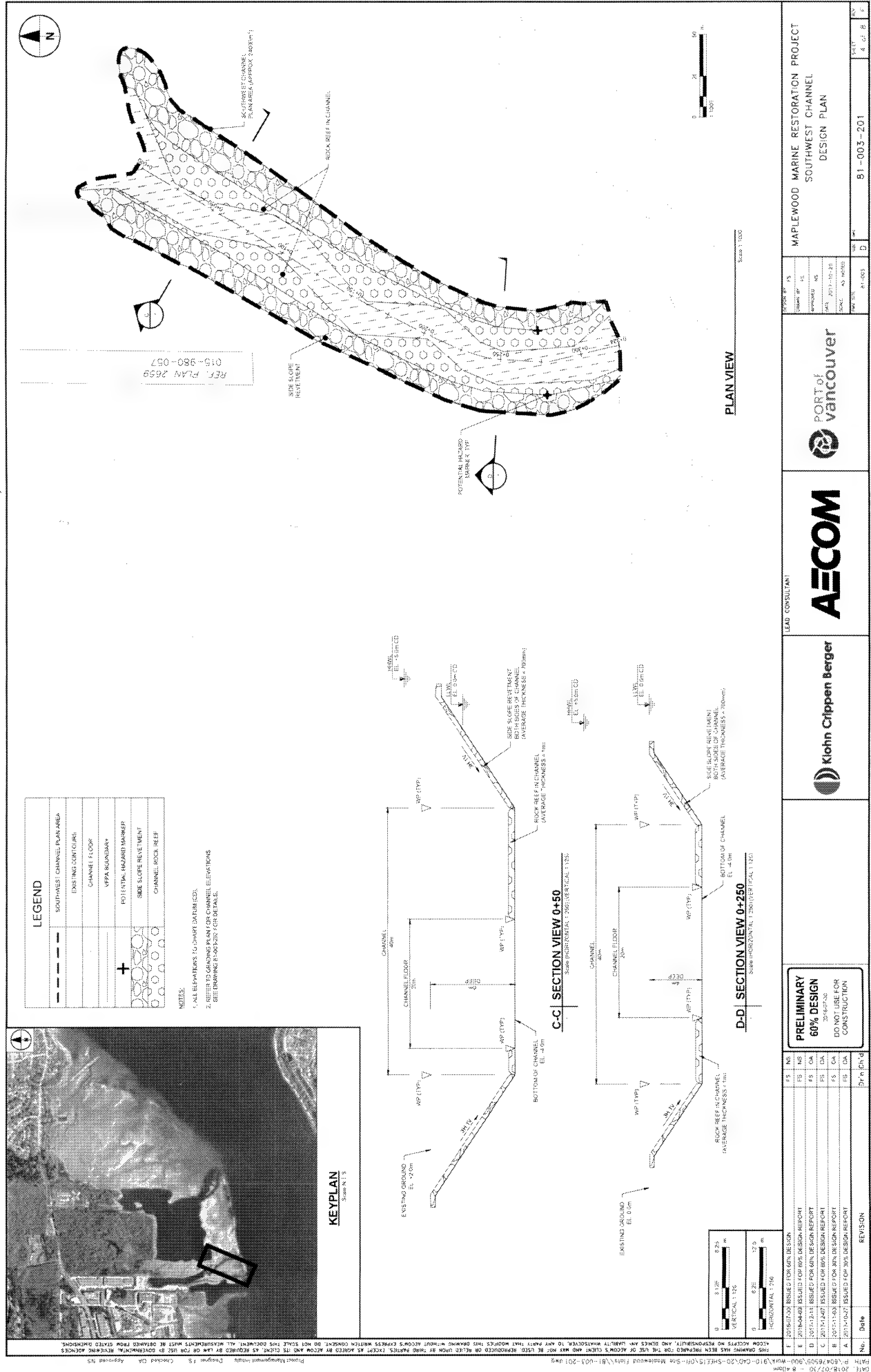


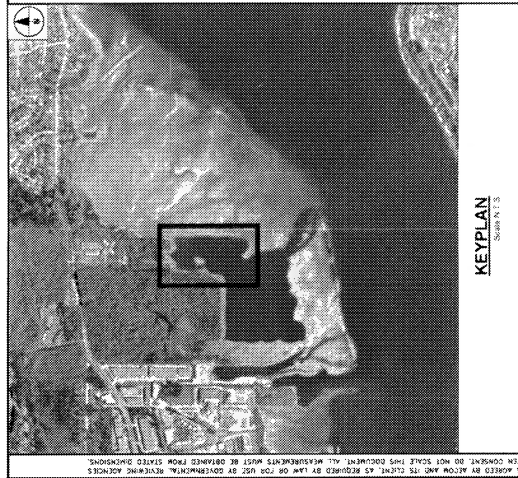
LEGEND	
	EXISTING CONTOURS
	VSEA BOUNDARY
	ARCHAEOLOGICAL SITE
	WORK AVOIDANCE ZONE

PROPOSED HABITAT AREA		NORTH EAST BASIN HABITAT SURFACE AREA (m <sup>2</sup> )	
HABITAT TYPE			
.....	.....	INTERIOR FLATS	18,400
.....	.....	EE GRASS BED	15,900
.....	.....	ROCK REEF AREA	1,006 (7,200 EXCL. CHANNEL S)
.....	.....	ROCK DYKE	NA
.....	.....	ASPEN ROCKS	360

NOTES:  
ALL ELEVATIONS TO CHART DRAINAGE;  
SLOPE REF. - INTERNAL CHANNEL SPACING TO BE FROM 3" TO 10".  
FOR GRADING PLAN REFER TO DRAWING 81403.02R2 FOR DETAILS.

[illegible]

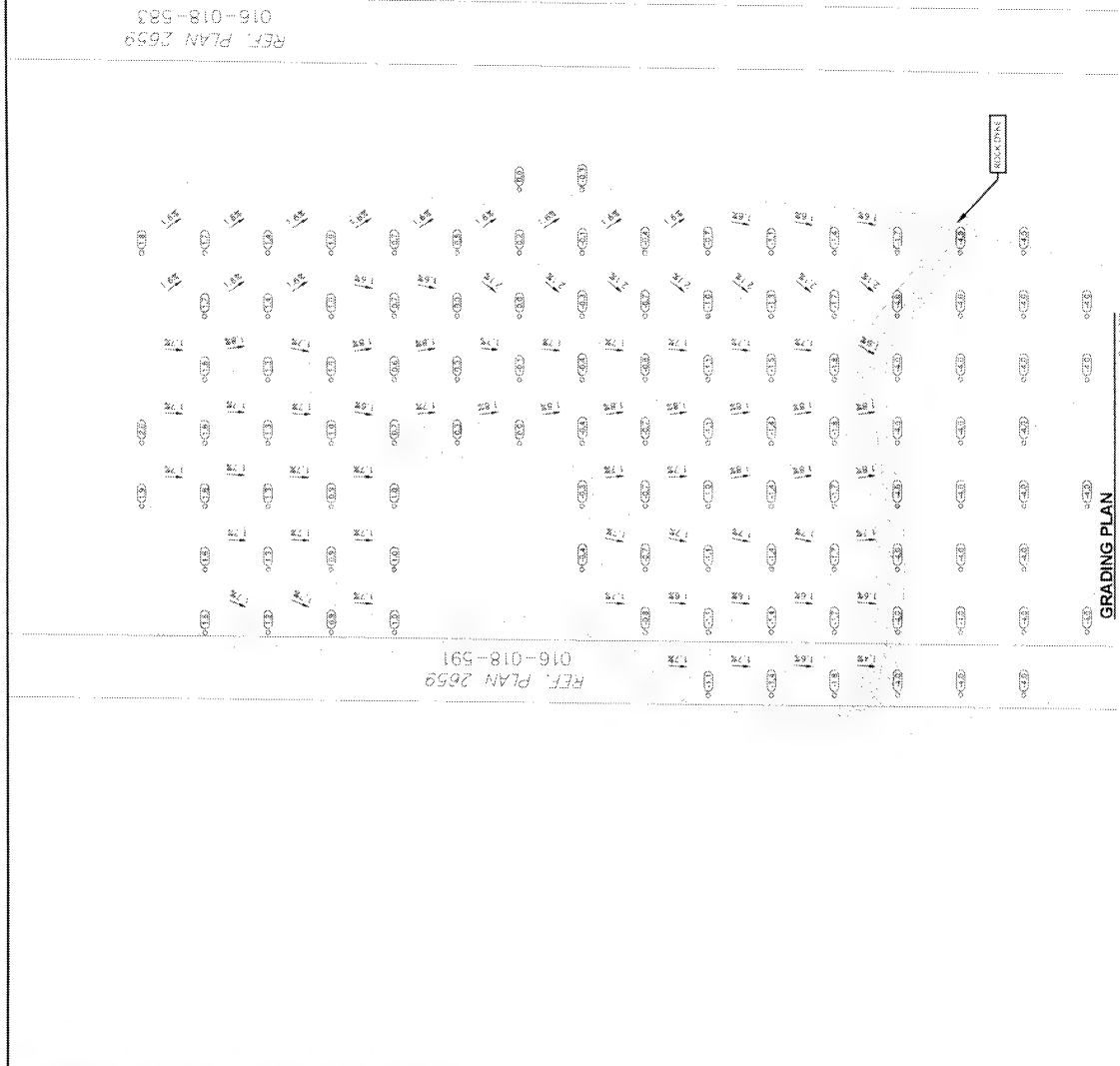




KEYPLAN  
Scale 1:15

LEGEND	
EXISTING CONTOURS	
VEHICLE BOUNDARY	
GRADE ELEVATIONS (ft. CG)	
SURFACE	
SLOPE GRADE	

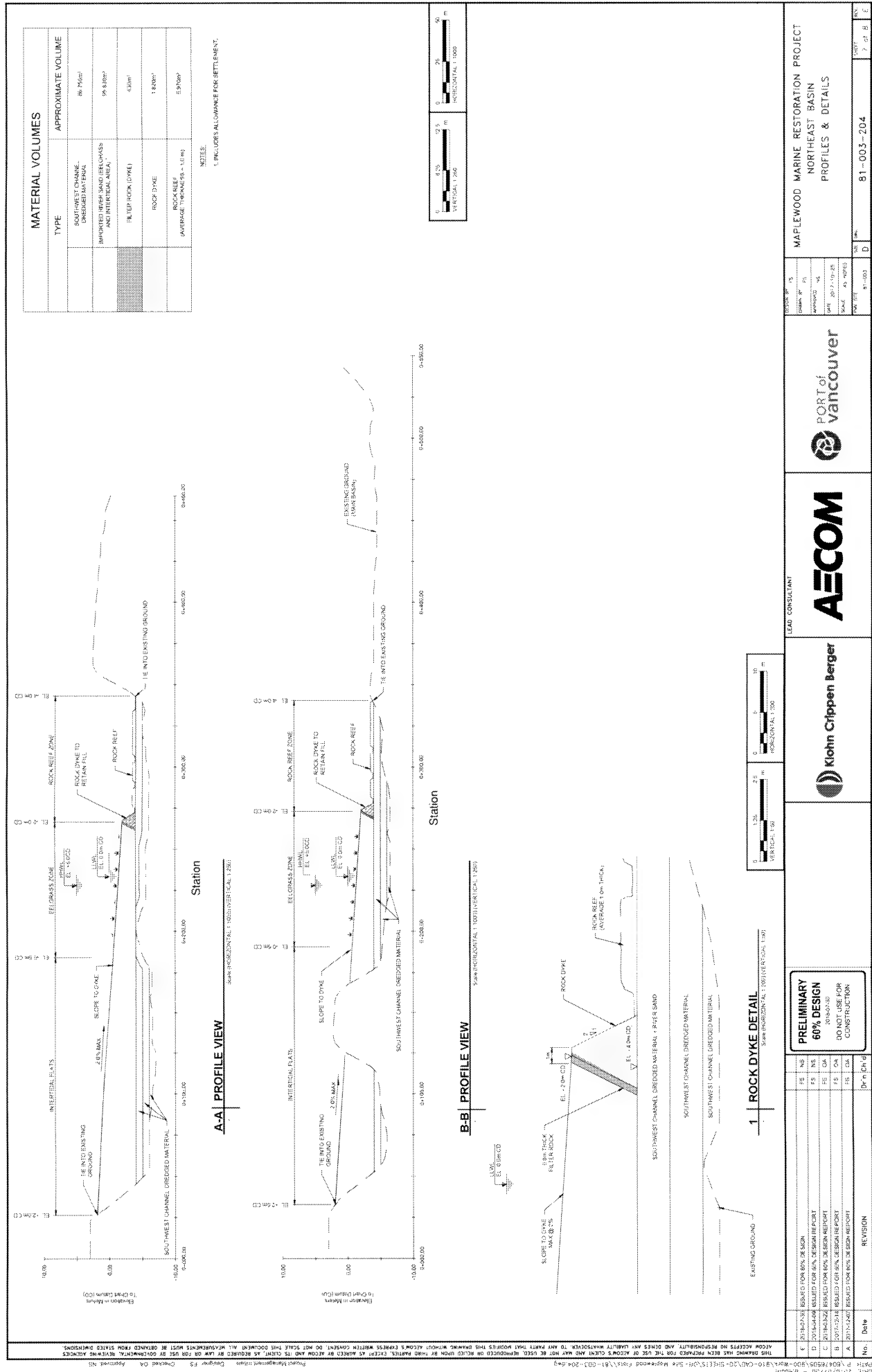
NOTES:  
1. ALL ELEVATIONS TO CHART DATUM (CD).  
2. FOR BATHYMETRIC POINTS REFER TO CHARTING  
PROJECT FILE FOR DATA.



GRADING PLAN  
Scale 1:100

PROJECT INFORMATION		
PROJECT NO.	81-003-202	
DATE	11/15/2021	
SCALE	AS NOTED	
PROJECT LOCATION		
MAPLEWOOD MARINE RESTORATION PROJECT NORTHEAST BASIN GRADING PLAN		
CLIENT		
PORT of Vancouver		
LEAD CONSULTANT		
AECOM		
DESIGNER		
Klohn Crippen Berger		
DESIGN STAGE		
PRELIMINARY 60% DESIGN		
DO NOT USE FOR CONSTRUCTION		
No.	Date	REVISION
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		









## Appendix C - Site Photos



# Maplewood Marine Restoration Project

## Site Photo Log

Photo 1: Barge Channel looking north, showing pipeline bridge and channel narrowing .....	2
Photo 2: Lagoon in Barge Channel north of pipeline bridge .....	2
Photo 3: Barge Channel looking south to pipeline bridge .....	3
Photo 4: Barge Channel bed looking north .....	3
Photo 5: Northeast Basin looking south from pipeline bridge .....	4
Photo 6: West side of Northeast Basin looking south (construction waste on foreshore) .....	4
Photo 7: West side of Northeast Basin looking north (construction waste on foreshore) .....	5
Photo 8: North side of Northeast Basin looking from the west side .....	5
Photo 9: Eastern edge of Northeast Basin .....	6
Photo 10: Northeast Basin (west side) from Northeast corner 1 .....	6
Photo 11: Northeast Basin (west side) from Northeast corner 2 .....	7
Photo 12: Northeast Basin (west side) from Northeast corner 3 .....	7
Photo 13: Northeast Basin (west side) from Northeast corner 4 .....	8
Photo 14: Northeast Basin (west side) from north side .....	8
Photo 15: Northeast Basin from southwest corner of Northeast Basin .....	9
Photo 16: Southwest corner of Main Basin looking south from the west side .....	9
Photo 17: Northern edge of Main Basin from the southwest corner of Main Basin .....	10
Photo 18: Northern edge of Main Basin .....	10
Photo 19: Southern Intertidal Area .....	11
Photo 20: Main Basin looking towards northwest corner (log boom) .....	11

Photo 1: Barge Channel looking north, showing pipeline bridge and channel narrowing



Photo 2: Lagoon in Barge Channel north of pipeline bridge



Photo 3: Barge Channel looking south to pipeline bridge



Photo 4: Barge Channel bed looking north



Photo 5: Northeast Basin looking south from pipeline bridge



Photo 6: West side of Northeast Basin looking south (construction waste on foreshore)



Photo 7: West side of Northeast Basin looking north (construction waste on foreshore)



Photo 8: North side of Northeast Basin looking from the west side





Photo 9: Eastern edge of Northeast Basin



Photo 10: Northeast Basin (west side) from Northeast corner 1



Photo 11: Northeast Basin (west side) from Northeast corner 2



Photo 12: Northeast Basin (west side) from Northeast corner 3



Photo 13: Northeast Basin (west side) from Northeast corner 4



Photo 14: Northeast Basin (west side) from north side

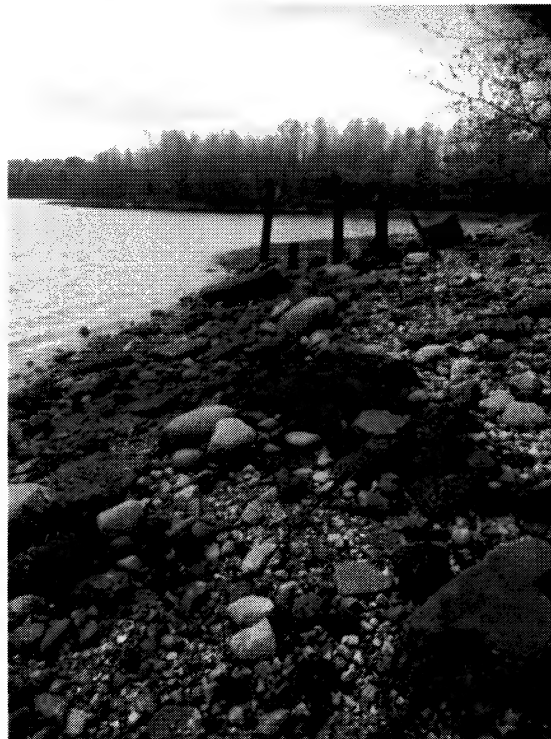




Photo 15: Northeast Basin from southwest corner of Northeast Basin



Photo 16: Southwest corner of Main Basin looking south from the west side



Photo 17: Northern edge of Main Basin from the southwest corner of Main Basin

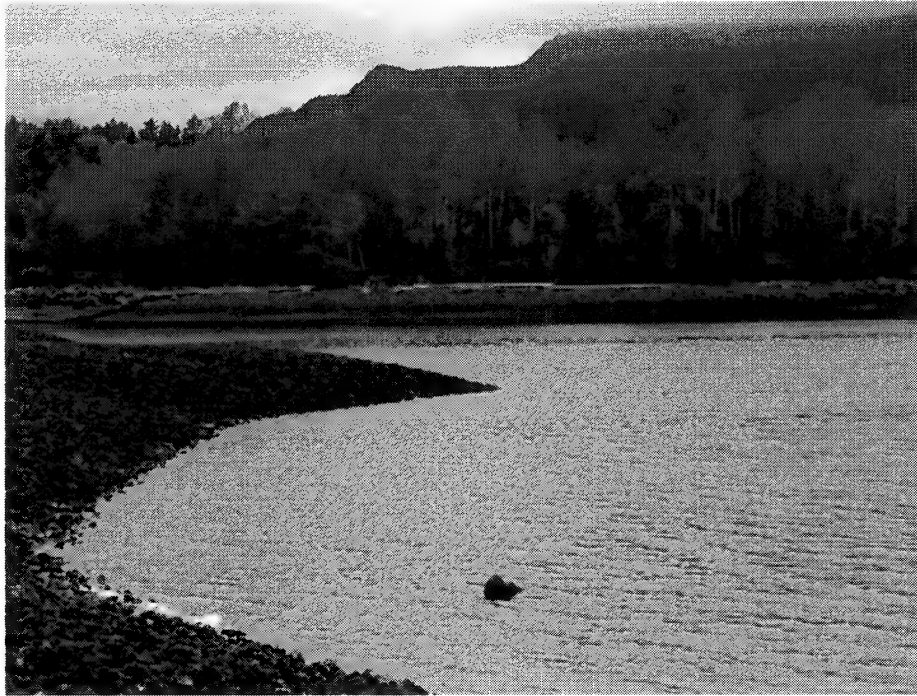


Photo 18: Northern edge of Main Basin



Photo 19: Southern Intertidal Area



Photo 20: Main Basin looking towards northwest corner (log boom)





Othman Alfaseeh  
Project Engineer  
T: 604-444-6590  
E: othman.alfaseeh@aecom.com

AECOM Canada Ltd.  
3292 Production Way  
Suite 330  
Burnaby, BC V5A 4R4  
Canada

T: 604.444.6400  
F: 604.294.8597  
aecom.com

## Nutton, Byron

---

**From:** Olson, Charlotte <Charlotte.Olson@portvancouver.com>  
**Sent:** 2019–March-18 9:04 AM  
**To:** Nutton, Byron  
**Cc:** Ruffo, Gord; 'Scott Northrup'; Thorpe, Suzanne  
**Subject:** RE: Additional Information for Maplewood - Design Report and IFT DWGs - Email 2  
**Attachments:** 2019-03-05-03-200-DWG-AECOM-MMRP IFT Package-Rev0 (11x17).pdf

Attached here are the IFT Drawings. The Southwest Channel Rock Reef Habitat Plan is shown on pg 6 of Drawing set (Drawing #2004)

Thanks,

**Charlotte Olson** P.Geo., PMP  
Manager, Infrastructure Habitat Development

CELL: 604.349.4111

**From:** Olson, Charlotte  
**Sent:** Monday, March 18, 2019 9:02 AM  
**To:** 'Nutton, Byron' <Byron.Nutton@dfo-mpo.gc.ca>  
**Cc:** Ruffo, Gord <Gord.Ruffo@portvancouver.com>; Scott Northrup <snorthrup@hemmera.com>; Thorpe, Suzanne <Suzanne.Thorpe@dfo-mpo.gc.ca>  
**Subject:** Additional Information for Maplewood - Design Report and IFT DWGs - Email 1

Good morning Byron

To follow up on our discussion last Thursday, I am directing you to the following report link:

<https://www.portvancouver.com/wp-content/uploads/2018/08/Attachment-01-MMRP-Habitat-Design-60P-Design-Report-July-2018.pdf>

- **60% Design Report for the Maplewood Project** – which was included as Appendix K to the February 2018 Centerm Expansion Project *Fisheries Act* Application
  - See Section 2.6.2 which includes engineering/coastal modelling information related to the anticipated Tidal Flushing improvements as a result of implementing the Southwest Channel

In a separate email – and due to the large file size, I will also be providing you with the final Issued for Tender (IFT) Drawings that have been prepared for the Maplewood Project – the drawings depict the additional design features that are included in the Southwest Channel to support productive habitat.

I would also like a quick call today to discuss the following:

1. VFPA would like the opportunity to revise & resubmit the Maplewood Project Confirmation, to address your comments received last week
2. VFPA would like the opportunity to meet again with you in the next 10 days, to present our approach – and to discuss next steps

Is there any time today that does not work for a quick call? Otherwise, I will try to track you down on your mobile.

Thank you, Charlotte

**Charlotte Olson** P.Geo., PMP  
Manager, Infrastructure Habitat Development



**Vancouver Fraser Port Authority**

100 The Pointe, 999 Canada Place  
Vancouver, B.C. Canada V6C 3T4

P: 604.665.9590 | CELL: 604.349.4111  
[portvancouver.com](http://portvancouver.com)



## MAPLEWOOD MARINE RESTORATION PROJECT ISSUED FOR TENDER



### DRAWING INDEX

81-003-1000 - COVERSHEET & DRAWING INDEX  
81-003-1001 - SITE PLAN  
81-003-1002 - GENERAL ARRANGEMENT

### SOUTHWEST CHANNEL

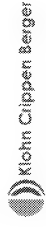
81-003-2001 - DREDGING PLAN  
81-003-2002 - CHANNEL & SIDE SLOPE, BEDDING & ARMOUR ROCK  
81-003-2004 - ROCK REEF HABITAT PLAN  
81-003-2005 - DETAILS  
81-003-2006 - DREDGE PRISM SECTIONS  
81-003-2100 - HAZARD MARKER DETAILS

### NORTHEAST BASIN

81-003-3001 - DESIGN PLAN  
81-003-3002 - GRADING PLAN  
81-003-3004 - DETAILS & SECTIONS  
81-003-3005 - PRELIMINARY STAGING PLAN

# AECOM

AECOM PROJECT NO. 60568791  
4th FLOOR, 392 PRODUCTION WAY  
BURNABY, BC, V5A 4R4





[illegible][illegible]

**LEAD CONSULTANT**



**Klohn Crippen Berger**

port of  
vancouver

PROJECT NO.		DATE	
CIVILIAN NO.		DATE	
APPROVED		APPROVED	
BY: 91-9-01-05		BY: 91-9-01-05	
SCALE: AS NOTED		SCALE: AS NOTED	
SHEET NO.		SHEET NO.	
81-003		81-003-1001	

[illegible]

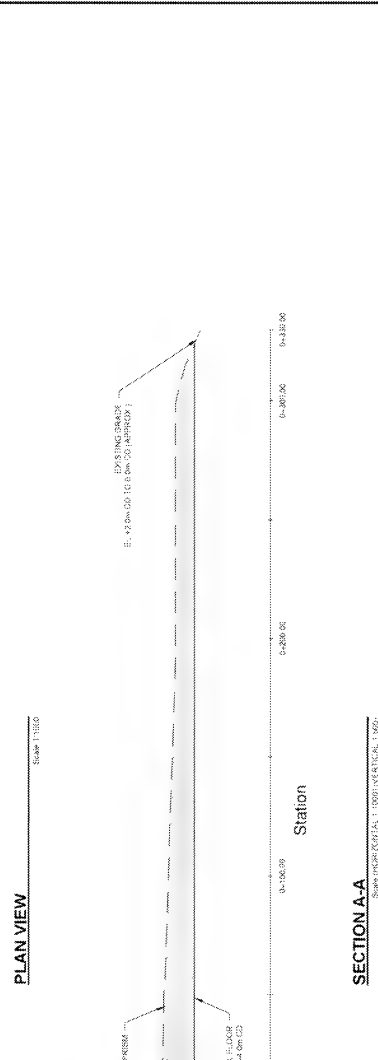
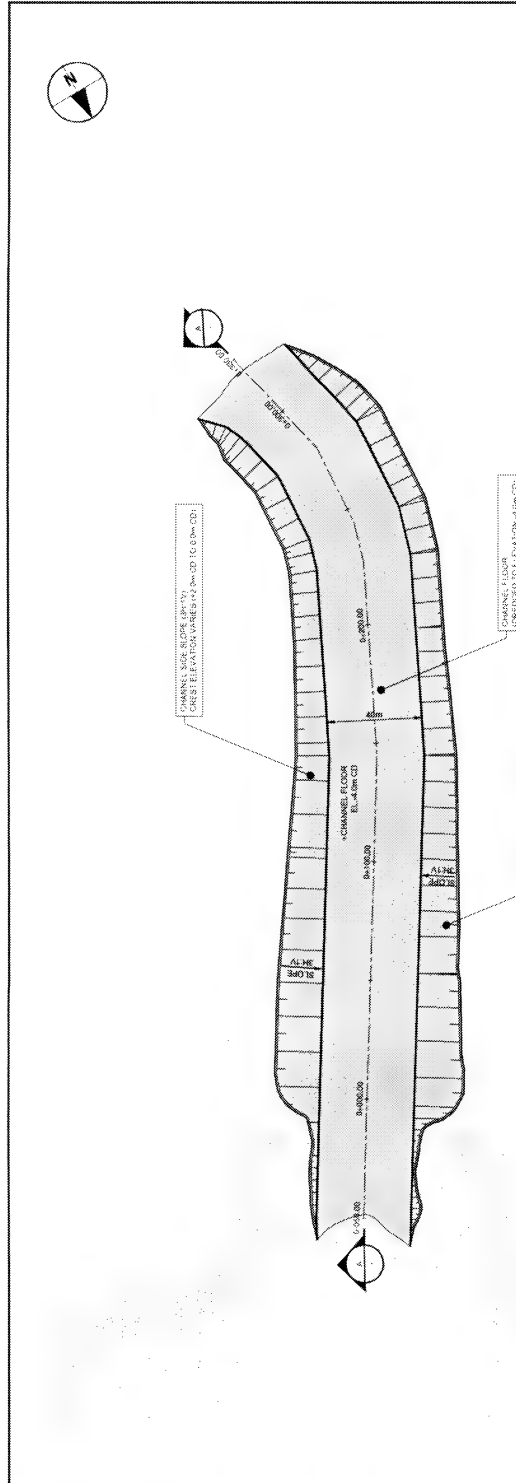







LEGEND	
—	SOUTHWEST PASSAGE
—	NORTHEAST PASSAGE
—	EASTING CENTER
—	VEGA BOUNDARY
—	HYDROGRAPHICAL SITE RECORDING POINT
—	LANDING (SOUTH EAST PASSAGE)

1.  $Z = 1.96$  (for 95% confidence interval)  
2.  $N = 100$  (sample size)  
3.  $p = 0.05$  (significance level)

[illegible]



No.	Date	REVISION	Drawn by	<div style="border: 1px solid black; padding: 5px; text-align: center;"><b>ISSUED FOR TENDER</b> <small>REVISED</small> DO NOT USE FOR CONSTRUCTION</div>	 <b>Klohn Crippen Berger</b>	 <b>AECOM</b>	 <b>PORT of vancouver</b>	<div style="display: flex; justify-content: space-between;"><div><small>DESIGN BY</small> TS <small>DESIGNED BY</small> TS <small>APPROVED BY</small> NS <small>DRAWN BY</small> JTB/JS/JS <small>CHECKED BY</small> NS <small>SCALE</small> AS SHOWN</div><div><small>PROJECT NO.</small> 81-003-2001 <small>DATE</small> 1998</div></div>	<b>MAPLEWOOD MARINE RESTORATION PROJECT</b> <b>SOUTHWEST CHANNEL</b> <b>DREDGING PLAN</b>

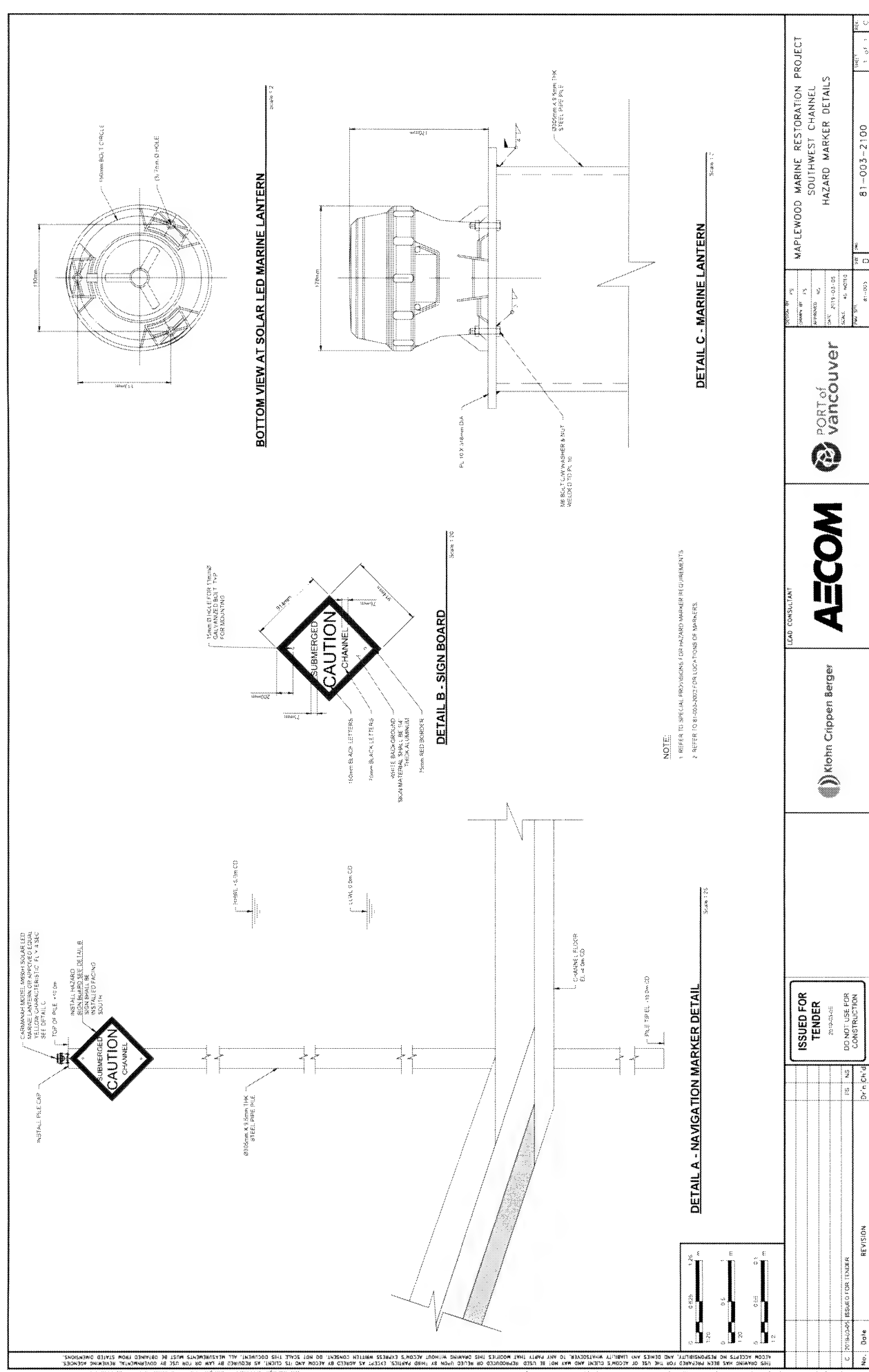






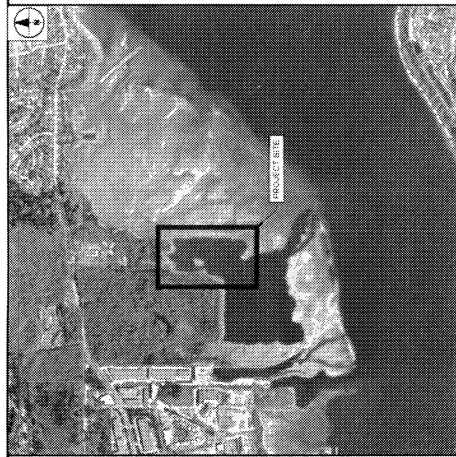




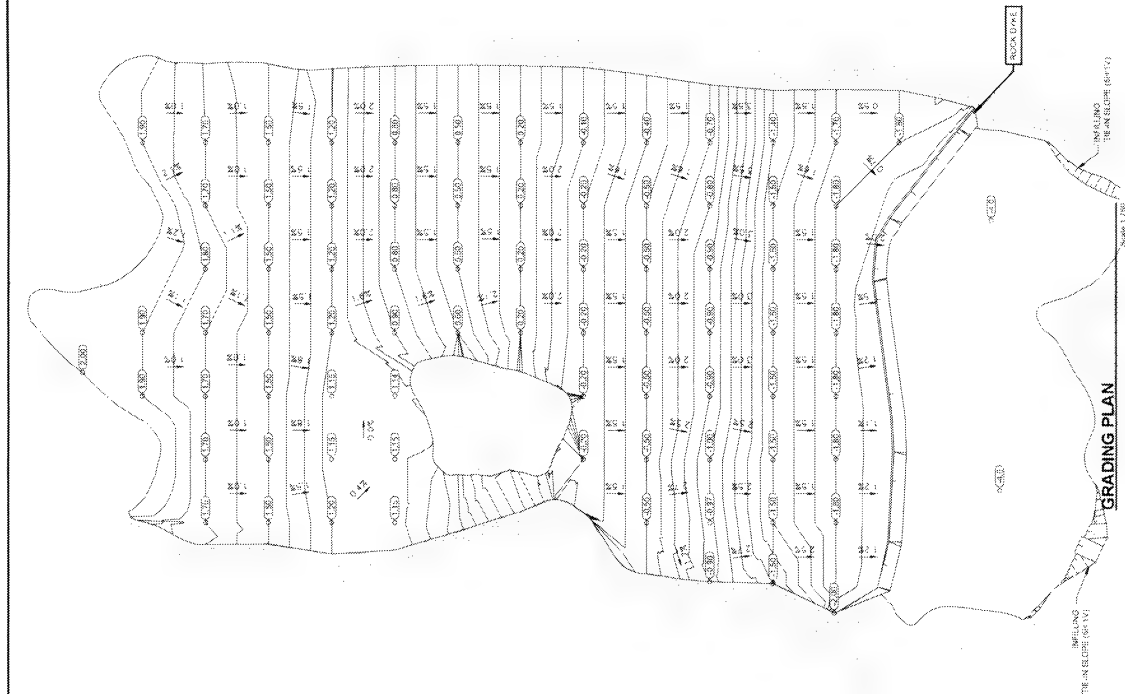








LEGEND	
	EXISTING CONTOURS
	GRADE ELEVATIONS (m. CD)
	FINISHED SURFACE
	SLOPE GRADE

NOTES:  
1. ALL ELEVATIONS TO CHART DATUM (CD).[illegible]





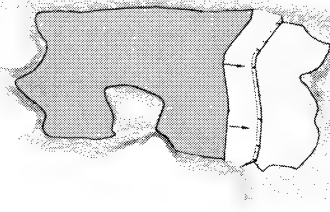
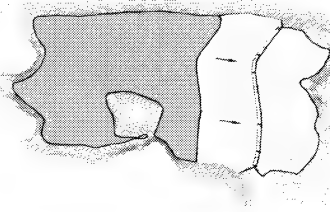
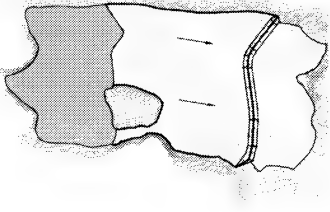
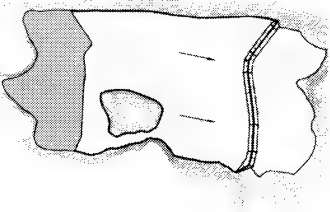
**LIFT #4B TO ELEVATION -2.0m CD**




NO: 197213 2845 50 200 01.00734

**LIFT # 5B TO ELEVATION -1.0m CD**

**LIFT #6B TO ELEVATION 0.0m CD**

**LIFT #7B TO ELEVATION +1.0m CD**



LEGEND	
	EXTENT OF LIFT - STAGE
	PREVIOUS FILL
	ASPECT, DIRECTION DE SLOPE


NOTES

5. ALL STAKES TO BE COMPLETED IN APPROX. 0.5m x 1.5m, WITH TARGETS ELEVATIONS FOR EACH LEG, EXCEPTING AND APPROXIMATE BY ALTIMETER REPRESENTATION, AFTER EACH LEG.
6. REFER TO SPECIAL PROVISIONS FOR ADDITIONAL DETAILS ON MATERIAL AND PLACEMENT REQUIREMENT.
7. HAS 05 MINIMUM DURATIONS BASED ON GEOTECHNICAL REVIEW OF SOILS, COMPLETION MONITORING, AND DETERMINED BY AUTHORITY REFERRED HERETO.



**ISSUED FOR  
TENDER**  
2018-03-05  
**DO NOT USE FOR  
CONSTRUCTION**

SN	3 s	4800 Hz, 100% FWHM	900 Hz, 100% FWHM



Klohn Crippen Berger

AECOM



PORT of  
vancouver

DISC# 84	PS
DISC# 87	PS
APPROVED	NIS
DATE	2019-03-05
SCALE	AS NOTED

MAPLEWOOD MARINE RESTORATION PROJECT  
NORTHEAST BASIN  
PRELIMINARY STAGING PLAN

81-003-3005

81-003-3005	81-003-3005	81-003-3005
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**Page 1466**

**is withheld pursuant to section  
est retenue en vertu de l'article**

**19(1)**

**of the Access to Information Act  
de la Loi sur l'accès à l'information**

## Nutton, Byron

---

**From:** [REDACTED]  
**Sent:** 2019–March-18 9:27 AM  
**To:** Nutton, Byron  
**Subject:** WDAFS Spring 2019 Tributary is now available

WDAFS Members—

The new latest edition of the WDAFS newsletter is now available on the Division website:  
<https://wdafs.org/download/archive/newsletters/2019/Vol43No1.pdf>

[REDACTED]  
Tributary Editors

---

If you want to unsubscribe from this {groupname} Group click [here](#)  
To file a complaint please send an eMail to: [complaints@emaildodo.com](mailto:complaints@emaildodo.com)

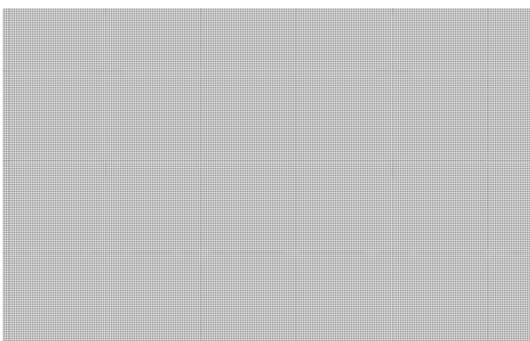
**Nutton, Byron**

---

**From:** [REDACTED]  
**Sent:** 2019–March-18 9:52 AM  
**To:** [REDACTED] Brian FLNR:EX Epps; [REDACTED]  
**Cc:** [REDACTED] Nutton, Byron; Blacklock, Cam; Ludlow, Mandy; FPP.PAC / PPP.PAC (DFO/MPO); Ben FLNR:EX Robinson; David FLNR:EX Robinson; Greg FLNR:EX Dohm; John.Baldwin@gov.bc.ca; Kevin FLNR:EX Telfer; Neil FLNR:EX Goeller; Pat FLNR:EX Lapcevic; Ron.Strangway@gov.bc.ca  
**Subject:** RE: Proposed Emergency Dike Repair to Blackley Dike, North Arm of Cowichan River

Hi Brian,

If excavation is part of the scope of work for this project, please contact [REDACTED] (copied here) to arrange for a cultural monitor to be present for this work.



Please consider the environment before printing this message.

**PRIVILEGE & CONFIDENTIALITY NOTICE:** The information transmitted is intended only for the person or entity to which it is addressed and may contain confidential and/or privileged material. If you are not the intended recipient, it may be unlawful for you to read, copy, disclose or otherwise use the information on this communication. If you received this transmittal in error, please contact the sender and delete the material immediately.

>>> "Epps, Brian FLNR:EX" <Brian.Epps@gov.bc.ca> 3/15/2019 3:17 PM >>>  
 Hi all,

As proposed in late February, the Water Protection Section, West Coast Region, FLNRORD has selected a successful bidder to undertake a small erosion mitigation project on the North Arm of the Cowichan River located immediately downstream of Tzouhalem Road.

The contractor (David Stalker Excavating Ltd.) is scheduled to commence work on March 18, 2019, at 8:00AM.

Access to the dike will be temporarily closed during the construction period.

As per the contractual agreement, the contractor is required to have a suitably qualified environmental monitor on site during all instream works. The contractor has retained the services of D. R. Clough Consulting to oversee this project.

I have advised the contractor that Cowichan Tribes may want to visit the work site and monitor the construction activity to ensure that their interests are not being adversely impacted as a result of the emergency repairs.

Please feel to contact me if you have any questions or concerns regarding this project.

### Brian Epps

Senior Regional Specialist, Water and Dike Safety  
Ministry of Forests, Lands and Natural Resource Operations and Rural Development  
West Coast Sub-Region

Tel. (250) 751-3141

Fax (250) 751-3103

E-Mail: [Brian.Epps@gov.bc.ca](mailto:Brian.Epps@gov.bc.ca)

Web Site: <https://www2.gov.bc.ca/gov/content/environment/air-land-water/water>

---

**From:** Jansen, Willi [<mailto:Willi.Jansen@dfo-mpo.gc.ca>]

**Sent:** Tuesday, February 26, 2019 6:37 PM

**To:** Epps, Brian FLNR:EX

**Cc:** Dohm, Greg FLNR:EX; Goeller, Neil FLNR:EX; FPP.PAC / PPP.PAC (DFO/MPO); Blacklock, Cam; Ludlow, Mandy; Nutton, Byron

**Subject:** RE: Proposed Emergency Dike Repair to Blackley Dike, North Arm of Cowichan River

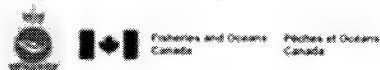
Hi Brian...Thank You so much for the heads up on this work. I have cc'ed the Fisheries Protection Program (Habitat) for their information, and to address any concerns that they may have for these emergency works.

I suspect that you have also notified Cowichan Tribes of your intent to do these works as well?

Willi ☺

### Willi Jansen

Fishery Officer | Officier de Pêcherie  
Conservation and Protection | Conservation et Protection  
Fisheries and Aquaculture Management | Pêches et Administration Aquaculture  
Fisheries and Oceans Canada | Pêches et Océans Canada  
5245 Trans Canada Highway  
Duncan, BC V0R 2C0  
[Willi.Jansen@dfo-mpo.gc.ca](mailto:Willi.Jansen@dfo-mpo.gc.ca)  
Telephone | Téléphone (250) 746-9721 / Facsimile | Télécopieur 250-746-8397 / Cellular | Cellulaire 250-709-4851




---

**From:** Epps, Brian FLNR:EX [<mailto:Brian.Epps@gov.bc.ca>]

**Sent:** February-26-19 4:18 PM



**To:** Jansen, Willi

**Cc:** Dohm, Greg FLNR:EX; Goeller, Neil FLNR:EX

**Subject:** Proposed Emergency Dike Repair to Blackley Dike, North Arm of Cowichan River

Hi Willi,

Just a quick note to advise you that FLNRORD is proposing to conduct emergency repairs to Blackley Dike prior to the end of March. The proposed works are being deemed an emergency as the structural integrity of the dike has been compromised by the erosional forces of the Cowichan River. The works are to be funded by Emergency Management BC.

I have put the project out to tender on BC Bid and expect to have a contractor secured by March 6<sup>th</sup>, 2019 and hopefully have the works completed by March 20<sup>th</sup> – 22<sup>nd</sup>, 2019.

The proposed work site is located immediately downstream of Tzouhalem Road bridge crossing the North Arm of the Cowichan River near the Cowichan estuary. The Blackley Dike erosion site is located on the right bank (south side of the North Arm) of the Cowichan River about 50 m downstream from Tzouhalem Road. The successful bidder (contractor) is required to retain the services of a qualified environmental monitor to be on-site during all instream works

Please advise if there is any DFO requirements in order to carry out these emergency works.

Thanks for your assistance,

**Brian Epps**

Senior Regional Specialist, Water and Dike Safety

Ministry of Forests, Lands and Natural Resource Operations and Rural Development

West Coast Sub-Region

Tel. (250) 751-3141

Fax (250) 751-3103

E-Mail: [Brian.Epps@gov.bc.ca](mailto:Brian.Epps@gov.bc.ca)

Web Site: <https://www2.gov.bc.ca/gov/content/environment/air-land-water/water>

**Pages 1471 to / à 1473  
are withheld pursuant to section  
sont retenues en vertu de l'article**

**21(1)(b)**

**of the Access to Information Act  
de la Loi sur l'accès à l'information**

**Pages 1474 to / à 1495  
are duplicates of  
sont des duplicatas des  
pages 1506 to / à 1527**

**Pages 1496 to / à 1504  
are withheld pursuant to section  
sont retenues en vertu de l'article**

**19(1)**

**of the Access to Information Act  
de la Loi sur l'accès à l'information**

**Pages 1505 to / à 1527  
are withheld pursuant to section  
sont retenues en vertu de l'article**

**21(1)(b)**

**of the Access to Information Act  
de la Loi sur l'accès à l'information**

**Nutton, Byron**

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**From:** Heather Leschied <[REDACTED]>  
**Sent:** 2019–March-18 2:08 PM  
**To:** Nutton, Byron  
**Subject:** Re: SHIM in the Columbia Basin & CNFASAR EOI

Hi Byron,

Further to my email sent last week, I did receive an out-of-office from Jordan. I wanted to follow up with you regarding my inquiry about the possibility to collaborate on the **Sensitive Habitat Inventory Mapping and Shoreline Development Guidance for Species at Risk in the Columbia Basin** project. Our team is preparing to submit the EOI as mentioned below, on Wednesday, March 20th. Given the history of DFO involvement and leadership in the long-term components of this program, it would be extremely valuable to continue collaboration going forward.

Please let me know if you have any questions.

Kind regards,  
Heather

Heather Leschied  
Operations Director  
Living Lakes Canada  
Nelson, BC  
[www.livinglakescanada.ca](http://www.livinglakescanada.ca)  
c: [REDACTED]



Living Lakes Canada facilitates collaboration in education, monitoring, restoration and policy development initiatives for the long-term protection of Canada's lakes, rivers, wetlands and watersheds.

On Mar 13, 2019, at 8:49 PM, Heather Leschied <[REDACTED]>

Hello Byron and Jordan,

Tola Cooper has connected me with the two of you regarding our proposal for the CNFASAR EOI for our project, **Sensitive Habitat Inventory Mapping and Shoreline Development Guidance for Species at Risk in the Columbia Basin**. Byron, you and I have connected previously about this project, and the available funds through CNFASAR is now very timely.

The work that is being proposed will be a collaboration of the Kootenay Lake Partnership, government agencies involved in the East Kootenay Integrated Lake Management Partnership, environmental consultants using SHIM (ie. EcoScape Environmental), as well as Bruce MacDonald and [REDACTED] Living Lakes Canada will facilitate and manage the project.

Since 2008, SHIM has been completed for 13 lakes in the Columbia Basin. The objectives of the proposed project are:

- a) Integrate technological advances and improvements to the methodology/data dictionary and data storage and access
- b) Re-SHIM priority lakes based on development pressures and presence of species at risk, and assess the rate of change over time / shoreline habitat loss (which has been done now on Okanagan Lake)
- c) Incorporate pre-contact archaeological and First Nations cultural values layers as they pertain to species at risk

With new projects now complete including Kootenay Lake, and most recently Brilliant Headpond, members of the Kootenay Lake Partnership and East Kootenay Integrated Lake Management Partnership have expressed interest in re-engaging with Fisheries and Oceans Canada, and are hoping that this project, along with recent changes to legislation will create the space for this. As you may be aware from [REDACTED] DFO initially started the partnership and brought SHIM to the Columbia Basin via [REDACTED] and Bruce MacDonald. Would it be appropriate to include DFO as a collaborator in this project going forward?

I am happy to provide any additional information as necessary.

Kind regards,  
Heather

Heather Leschied  
Operations Director  
Living Lakes Canada  
Nelson, BC  
[www.livinglakescanada.ca](http://www.livinglakescanada.ca)  
c: 250-354-9206

<logo.gif>

Living Lakes Canada facilitates collaboration in education, monitoring, restoration and policy development initiatives for the long-term protection of Canada's lakes, rivers, wetlands and watersheds.



**Nutton, Byron**

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**From:** Boutillier, Jaclyn  
**Sent:** 2019–March-18 2:47 PM  
**To:** Runciman, Bruce  
**Cc:** Nutton, Byron  
**Subject:** RE: For Approval - 16-HPAC-01323 - Artlish River Off-Channel Habitat Restoration

Hi Bruce,

My apologies! I did inquire about this, as [REDACTED]

[REDACTED] This is included in PATH; however, I will make sure to update a reference in the checklist when I'm back in the office on Thursday and have access.

Thanks,

Jaclyn

**From:** Runciman, Bruce <Bruce.Runciman@dfo-mpo.gc.ca>  
**Sent:** Monday, March 18, 2019 2:14 PM  
**To:** Boutillier, Jaclyn <Jaclyn.Boutillier@dfo-mpo.gc.ca>  
**Cc:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Subject:** RE: For Approval - 16-HPAC-01323 - Artlish River Off-Channel Habitat Restoration

Hi Jaclyn.

Thanks for your work on this report. I've gone over the information you provided and made minor edits to the report checklist (see "tracked changes" version, also attached). There is also one point requiring follow-up with the recipient before this package is ready for NHQ:

- [REDACTED]

As long as my changes to the checklist are acceptable, the question of permits/approvals addressed and documented and new versions of edited documents are uploaded to PATH Action ID No. 82, then I recommend Team Leader approval of this reporting package and submission to NHQ for review and payment.

**Byron, can you please confirm that this determination and action are acceptable?**

As always, please let me know if you have any questions or concerns.

Thanks again, Bruce.

PS. I also changed document types in PATH Action ID No. 82 so that the Schedule 7 is "RFCPP - Recipient Report" and the recipient's narrative report is "RFCPP - Recipient Report – Supporting Documents" (instead of the other way around).

**From:** Boutillier, Jaclyn <[Jaclyn.Boutillier@dfo-mpo.gc.ca](mailto:Jaclyn.Boutillier@dfo-mpo.gc.ca)>

**Sent:** March 7, 2019 3:44 PM

**To:** Runciman, Bruce <[Bruce.Runciman@dfo-mpo.gc.ca](mailto:Bruce.Runciman@dfo-mpo.gc.ca)>

**Cc:** Nutton, Byron <[Byron.Nutton@dfo-mpo.gc.ca](mailto:Byron.Nutton@dfo-mpo.gc.ca)>

**Subject:** For Approval - 16-HPAC-01323 - Artlish River Off-Channel Habitat Restoration

Hi Bruce,

Please find attached a Report Checklist, Final Report and all other supporting documents for 16-HPAC-1323 Artlish River Off-Channel Habitat Restoration. All supporting documents are also posted in PATH, **Action Log #82**.

Sufficient information has been provided to justify DFO's acceptance of the group's Annual Report and a payment of: **\$33,827**.

Please let me know if you have any further questions or concern.

Thanks,

**Jaclyn Boutillier**

Fisheries Protection Biologist  
Fisheries Protection Program, Ecosystems Management Branch  
Fisheries and Oceans Canada/Government of Canada  
[Jaclyn.Boutillier@dfo-mpo.gc.ca](mailto:Jaclyn.Boutillier@dfo-mpo.gc.ca)/Tel: 250 756-7263

Programme de protection des pêches, Gestion des écosystèmes  
Pêches et Océans Canada/Gouvernement du Canada  
[Jaclyn.Boutillier@dfo-mpo.gc.ca](mailto:Jaclyn.Boutillier@dfo-mpo.gc.ca)/Tel: 250-756-7263

## Nutton, Byron

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**Subject:** Coordination call  
**Location:** DFO CONF Nanaimo-3190HammondBayRd-T325 - QUIet Room CONF MPO; DFO  
CONF Vancouver-401BurrardSt-13-Somass CONF MPO  
  
**Start:** Mon 2019-03-18 4:00 PM  
**End:** Mon 2019-03-18 4:30 PM  
**Show Time As:** Tentative  
  
**Recurrence:** (none)  
  
**Meeting Status:** Not yet responded  
  
**Organizer:** Major, Stephanie  
**Required Attendees:** Nutton, Byron

## Nutton, Byron

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**From:** Seair Seaplanes <contact@seairseaplanes.com>  
**Sent:** 2019-March-18 3:06 PM  
**To:** Nutton, Byron  
**Subject:** Booking [REDACTED] Mar 19, 2019 Nanaimo > Vancouver Harbour  
**Attachments:** invoice\_[REDACTED]

We have received your order and it is being processed. Your invoice is attached to this email.

Your booking number is [REDACTED]

Flight 317: Nanaimo -> Vancouver Harbour March 19, 2019 09:00 Passengers :

Flight 368: Vancouver Harbour -> Nanaimo March 19, 2019 16:00 Passengers :

Thank you for booking with Seair Seaplanes. If you have any questions or changes, please contact us:

Richmond/Gulf Islands  
1-800-447-3247  
contact@seairseaplanes.com

Nanaimo  
1-866-692-6440  
nanaimo@seairseaplanes.com

Downtown Vancouver Harbour  
604-647-7575  
vancouver@seairseaplanes.com



www.seairseaplanes.com  
contact@seairseaplanes.com

**Richmond Airport**  
Tel: 604-273-8900  
1-800-447-3247  
4640 Inglis Dr.,  
Richmond BC V7B 1W4

**Nanaimo**  
Tel: 250-753-1115  
1-866-692-6440  
1956 Zorkin Rd.,  
Nanaimo BC V9S 5T9

**Vancouver Harbour Downtown**  
Tel: 604-647-7575  
Unit #1 Burrard Landing,  
1055 Canada Place,  
Vancouver, BC, V6C 0C3

## Booking

Date: 2019-03-01 11:51:33

### CONDITIONS:

**Changes and cancellations:** can be made by calling Reservations at 1-800-447-3247. Tickets are non-transferable and non-refundable within 12 hours of departure time for the Gulf Island routes and within 3 hours of departure time for both Nanaimo routes. Customers who do not show up for their flight will forfeit the fare paid, and if applicable, the return flight will be automatically cancelled.

**Super Saver Webfares & Last Minute Webfares:** are only applicable for those flights as noted. Any cancellations or changes to these particular bookings will result in a forfeit of the discounted rate.

**Check-in:** is 30 minutes prior to the flight time. All passengers 18 years or older must present valid government issued photo ID.

**Boarding:** will commence 10 minutes prior to flight time.

**Baggage allowance:** Baggage allowance for all scheduled routes is 35 lbs (16kg) per paying passenger, this includes all carry-on and checked baggage. Any excess baggage, including specialty items, such as sporting equipment, strollers and car seats will travel on a stand-by basis, space available and are subject to additional fees of \$.50 /lb on both Nanaimo Routes and \$1.00 /lb on all Gulf Island Routes. If you have more than 35 lbs or have specialty items, please contact one of our agents at 1-800-447-3247, and we'll be happy to provide assistance with your baggage request.

Item	Description	Amount
Airfare	Name : Byron Nutton Fare Type : Adult Status: CANCELLED Date : Tuesday March 19th, 2019 09:00:00 AM Flight : 317 Nanaimo -> Vancouver Harbour	0.00
Airfare	Name : Byron Nutton Fare Type : Adult Status: CANCELLED Date : Tuesday March 19th, 2019 04:00:00 PM Flight : 368 Vancouver Harbour -> Nanaimo	0.00

**Dangerous Goods:** For Safety reasons, dangerous goods must not be packed in checked or carry-on baggage, except as specifically permitted. Dangerous goods include, but are not limited to: compressed gases, corrosives, explosives, flammable liquids and solids, radioactive materials, oxidizing materials, poisons, infectious substances, disabling devices, and electro-shock weapons. If there are any questions please phone or see <https://www.iata.org/whatwedo/cargo/dgr/Documents/DGR-59-EN-2.3a.pdf> for more information.

GST (5%) 0.00

Total \$ CAD 0.00

Amount Paid \$ CAD 218.00

### Limitation of Liability Conditions of Carriage.

The term "Carrier", as used herein, shall mean Seair Seaplanes Ltd., carrying on business as Seair. The Carrier, their servants and agents shall be under no liability in respect or arising out of the carriage of any other services or operations of the Carrier, their servants or agents and the passenger by acceptance of this ticket hereby waives for himself, his representatives and dependants all claims against the Carrier, their servants or agents for compensation or damage, whether in the case of personal injury, death or property damage and whether sustained on board the aircraft or in the course of any of the operations of flight, embarking or disembarking or otherwise and whether caused directly or indirectly to him or his belongings or to persons who act, neglect or default, of the Carrier, their servants or agents or otherwise howsoever (except to the extent the Convention of Warsaw may apply of International flights);

And action against the Carrier shall be brought in the Supreme Court of British Columbia at Vancouver, B.C. and the laws of the Province of British Columbia shall apply to any action against the Carrier. In the event these conditions or any part thereof, relating to the limitation of the liability of the Carrier are found to be contrary to the laws of British Columbia or, notwithstanding condition (c), any other jurisdiction in which action is brought, the liability of the Carrier shall be:

- Excluded or limited insofar as such law permits and the Carrier shall be entitled to benefit of every exclusion or limitation of liability permitted by such law; and
- The carrier may cancel any flight at point of origin or at any other point and may omit any stop at any time it deems such action advisable or necessary;
- The carrier will not be responsible for failure of aircraft to depart or arrive at the arranged time;

Any parent, Guardian or other adult, by acceptance of this ticket with respect to any passenger who is a minor; hereby accepts these conditions on behalf of such minor and agrees to indemnify the Carrier with respect to any claim brought by or on behalf of such minor.

Reference #:  
GST #: R104759725

**Nutton, Byron**

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**From:** Major, Stephanie  
**Sent:** 2019-March-18 3:24 PM  
**To:** Nutton, Byron  
**Subject:** Re: PSPM coordination

Sent from my Bell Samsung device over Canada's largest network.

----- Original message -----

From: "Nutton, Byron" <Byron.Nutton@dfo-mpo.gc.ca>  
Date: 2019-03-18 3:09 PM (GMT-08:00)  
To: "Major, Stephanie" <Stephanie.Major@dfo-mpo.gc.ca>  
Subject: PSPM coordination

Hi Steph,

[REDACTED] Can you call me on my BlackBerry when it's time (3:45 I believe) or earlier if that works better for you.

[REDACTED]

Thanks, Byron

[REDACTED]

## **Nutton, Byron**

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**From:** Fanos, Brad  
**Sent:** 2019–March-18 4:17 PM  
**To:** Nutton, Byron  
**Subject:** Question On VFPA agreement

Byron

I have RD signature but I noticed the first page has no date?

Are you in? Can you call me . I am here til 430

s.19(1)

s.21(1)(b)

## Nutton, Byron

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**From:** Norma Powell <npowell@hemmera.com>  
**Sent:** 2019-March-18 5:07 PM  
**To:** Nutton, Byron  
**Cc:** [REDACTED]  
**Subject:** {2200-001.01}18Mar\_eml\_hemmera\_to\_dfo\_Commenting on the Evaluation - confirmaiton

Hi Byron,

We are going to send you a quick figure and summary of our discussion last week to confirm what we believe is the best, most reasonable approach for the effects to fish and fish habitat.

Also, I'm looking at confirmation, for the record, that at this stage DFO would not be providing comment on the current Effects Evaluation as you will not be participating in this S67 determination until an FAA application is submitted, deemed complete, and determined that the activity could be authorized.

The First Nations are interested in knowing which FAs will be commenting.

Is this correct? Not comments at this stage?

Thanks,

**Norma Powell, R.P.Bio., ENV SP**  
**Hemmera, an Ausenco Company**  
T: 604.669.0424 ext. [REDACTED] | C: [REDACTED]

---

**From:** Engelsjord, Michael <Michael.Engelsjord@dfo-mpo.gc.ca>  
**Sent:** March 5, 2019 3:10 PM  
**To:** Norma Powell <npowell@hemmera.com>  
**Cc:** Nutton, Byron <Byron.Nutton@dfo-mpo.gc.ca>  
**Subject:** RE: 2200 email request

Hi Norma,

Following up on our meeting of yesterday, the following describes DFO's role in the environmental assessment process that is underway to satisfy section 67 of CEAA.

At this time DFO has not received an application for authorization under section 35(2)(b) of the *Fisheries Act* in relation

[REDACTED]

DFO is participating in the current environmental assessment process to help ensure that it will meet the requirements of section 67 of CEAA.

I have copied my colleague, Byron Nutton, as he will be replacing me as the DFO contact for this project. Please include Byron in any future correspondence for DFO.



s.19(1)

Regards,

Mike

Michael Engelsjord

Team Leader, Fisheries Protection Program / Ecosystem Management Branch  
Fisheries and Oceans Canada / Government of Canada  
[Michael.Engelsjord@dfo-mpo.gc.ca](mailto:Michael.Engelsjord@dfo-mpo.gc.ca) / Tel. : 604-666-2365

Chef d'équipe, Programme de protection des pêches / Direction des écosystèmes  
Pêches et Océans Canada / Gouvernement du Canada  
[Michael.Engelsjord@dfo-mpo.gc.ca](mailto:Michael.Engelsjord@dfo-mpo.gc.ca) / Tél. : 604-666-2365

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**From:** Norma Powell <[npowell@hemmera.com](mailto:npowell@hemmera.com)>

**Sent:** Tuesday, March 5, 2019 4:01 AM

**To:** Engelsjord, Michael <[Michael.Engelsjord@dfo-mpo.gc.ca](mailto:Michael.Engelsjord@dfo-mpo.gc.ca)>

**Subject:** 2200 email request

Hi Mike,

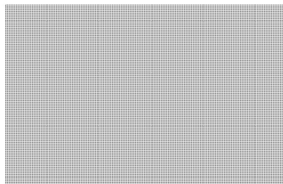
Thanks again for your time.

Would be great if you could send me that prepared email outlining the DFO S67 / approach.

Regards,

Norma Powell

Hemmera



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[Confidentiality Notice](#)

**Pages 1540 to / à 1541  
are withheld pursuant to section  
sont retenues en vertu de l'article**

**19(1)**

**of the Access to Information Act  
de la Loi sur l'accès à l'information**